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**Economic Commission for Europe**

Inland Transport Committee

**Working Party on the Transport of Dangerous Goods**

**Joint Meeting of Experts on the Regulations annexed to the
European Agreement concerning the International Carriage
of Dangerous Goods by Inland Waterways (ADN)
(ADN Safety Committee)**

**Thirty-eighth session**

Geneva, 23–27 August 2021

Item 3 (d) of the provisional agenda

**Implementation of the European Agreement concerning the
International Carriage of Dangerous Goods by Inland Waterways (ADN):
Training of experts**

 ADN catalogue of questions 2021

 Gas

 Transmitted by the Central Commission for the Navigation of the Rhine (CCNR)[[1]](#footnote-2)\*,[[2]](#footnote-3)\*\*

| Gas – Knowledge of physics and chemistryExamination objective 1.1: Law of ideal gases, Boyle-Mariotte – Gay-Lussac |
| --- |
| *Number* | *Source* | *Correct answer* |
|  |  |  |
| 231 01.1-01 | Boyle-Mariotte law: *pV*=constant | C |
|  | A quantity of nitrogen subject to an absolute pressure of 100 kPa takes up a volume of 60 m3. At a constant temperature of 10 °C, the nitrogen is compressed to an absolute pressure of 500 kPa.What is the resulting volume?A 1 m3B 11 m3C 12 m3D 20 m3 |  |
| 231 01.1-02 | Boyle-Mariotte law: *pV*=constant | C |
|  | Some propane vapour is in a cargo tank of 250 m3 at ambient temperature and at an absolute pressure of 400 kPa. Through a hole in the piping, enough propane escapes for the pressure in the cargo tank to decrease. What is the volume of the propane cloud if it does not mix with the air?A 250 m3B 500 m3C 750 m3D 1,000 m3 |  |
| 231 01.1-03 | Boyle-Mariotte law: *pV=*constant | B |
|  | A given quantity of nitrogen has a volume of 50 m3 at an absolute pressure of 160 kPa. The nitrogen is compressed to a volume of 20 m3. The temperature remains constant. What is the resulting absolute pressure of the nitrogen?A 250 kPaB 400 kPaC 500 kPaD 600 kPa |  |
| 231 01.1-04 | Boyle-Mariotte law: *pV*=constant | A |
|  | There is nitrogen in a cargo tank of 250 m3 at an absolute pressure of 220 kPa. What amount of nitrogen is required to bring the absolute pressure in the tank to 400 kPa?A 450 m3B 700 m3C 950 m3D 1,200 m3 |  |
| 231 01.1-05 | Boyle-Mariotte law: *pV*=constant | B |
|  | A quantity of nitrogen takes up a volume of 50 m3 at an absolute pressure of 320 kPa. At a constant temperature, the volume is reduced to 10 m3. What is the resulting absolute pressure of the nitrogen?A 1,100 kPaB 1,600 kPaC 2,000 kPaD 2,100 kPa |  |
| 231 01.1-06 | Gay-Lussac law: *p/T*=constant | C |
|  | In a closed tank, there is propane vapour at an absolute pressure of 120 kPa and at a temperature of 10 °C. With the volume of the tank remaining constant, the temperature is increased until the pressure reaches an absolute pressure of 140 kPa. What is the resulting temperature of the gas?A 12 °CB 20 °CC 57 °CD 293 °C |  |
| 231 01.1-07 | Gay-Lussac law: *p/T*=constant | D |
|  | A cargo tank contains propane gas at an absolute pressure of 500 kPa at a temperature of 40 °C. The propane gas cools to 9 °C. What is the absolute pressure in the cargo tank?A 100 kPaB 120 kPaC 360 kPaD 450 kPa |  |
| 231 01.1-08 | Gay-Lussac law: *p/T*=constant | D |
|  | A cargo tank of 300 m2 contains nitrogen at an absolute pressure of 250 kPa at -12 °C. The temperature of the nitrogen increases to 30 °C. What is the resulting absolute pressure?A 180 kPaB 290 kPaC 450 kPaD 750 kPa |  |
| 231 01.1-09 | Gay-Lussac law: *p/T*=constant | B |
|  | A drum of 10 m3 filled with nitrogen is under an absolute pressure of 1,000 kPa at a temperature of 100 °C. With the drum volume remaining constant, the drum and its contents are cooled to ‑12 °C. What is the resulting absolute pressure?A 100 kPaB 600 kPaC 700 kPaD 800 kPa |  |
| 231 01.1-10 | Gay-Lussac law: *p/T*=constant | B |
|  | In a cargo tank, there is nitrogen at a temperature of 40 °C. The absolute pressure of 600 kPa has to be reduced to 500 kPa. The nitrogen must be cooled to what temperature?A To -22.6 °CB To -12.2 °CC To 33.3 °CD To 32 °C |  |

| **Gas – Knowledge of physics and chemistry****Examination objective 1.2: Law of ideal gases, Fundamental laws** |
| --- |
| *Number* | *Source* | *Correct answer* |
|  |  |  |
| 231 01.2-01 | Fundamental law of gases: *pV/T*=constant | A |
|  | The temperature of a volume of gas of 40 m3 at an absolute pressure of 100 kPa is increased from 20 °C to 50 °C. The absolute pressure increases to an absolute pressure of 200 kPa. What is the resulting volume?A 22 m3B 29 m3C 33 m3D 50 m3 |  |
| 231 01.2-02 | Fundamental law of gases: *pV/T*=constant | B |
|  | A gas takes up a volume of 9 m3 at an absolute pressure of 100 kPa and a temperature of 10 °C. The temperature is increased to 51 °C and at the same time the volume is reduced to 1 m3. What is the resulting absolute pressure?A 930 kPaB 1,030 kPaC 1,130 kPaD 2,050 kPa |  |
| 231 01.2-03 | Fundamental law of gases: *pV/T*=constant | D |
|  | A gas takes up a volume of 40 m3 at a temperature of 50 °C and at an absolute pressure of 200 kPa. With the temperature reduced to 10 °C, the gas is at an absolute pressure of 100 kPa. What is the resulting volume?A 12 m3B 16 m3C 52 m3D 70 m3 |  |
| 231 01.2-04 | Fundamental law of gases: *pV/T*=constant | C |
|  | A gas takes up a volume of 20 m3 at a temperature of 50 °C and at an absolute pressure of 200 kPa. The temperature of the gas is reduced to 18 °C and the volume is increased to 40 m3. What is the resulting absolute pressure of the gas?A 40 kPaB 60 kPaC 90 kPaD 140 kPa |  |
| 231 01.2-05 | Fundamental law of gases: *pV/T*=constant | D |
|  | A gas takes up a volume of 10 m3 at 3.0 °C and at an absolute pressure of 100 kPa. To what temperature must the gas be brought so that at an absolute pressure of 110 kPa it takes up a volume of 11 m3?A 3.5 °CB 3.6 °CC 46 °CD 61 °C |  |
| 231 01.2-06 | Fundamental law of gases: *pV/T*=constant | B |
|  | A gas takes up a volume of 20 m3 at a temperature of 77 °C and an absolute pressure of 100 kPa. To what temperature should the gas be cooled so that it occupies a volume of 8 m3 at an absolute pressure of 200 kPa?A -63 °CB 7 °CC 46 °CD 62 °C |  |
| 231 01.2-07 | Fundamental law of gases: *pV/T*=constant | A |
|  | At a temperature of 10 °C and an absolute pressure of 100 kPa, a gas occupies a volume of 70 m3. What is the volume when the pressure is brought to an absolute pressure of 200 kPa and the temperature to 50 °C?A 40 m3B 53 m3 C 117 m3D 175 m3 |  |
| 231 01.2-08 | Fundamental law of gases: *pV/T*=constant | B |
|  | At a temperature of 10 °C and an absolute pressure of 100 kPa, a gas takes up 5 m3. What is the volume when the pressure is brought to an absolute pressure of 200 kPa and the temperature is 170 °C?A 2.0 m3B 3.9 m3 C 5.3 m3 D 42.5 m3 |  |
| 231 01.2-09 | Fundamental law of gases: *pV/T*=constant | A |
|  | A gas takes up 8 m3 at a temperature of 7 °C and at an absolute pressure of 200 kPa. What is the absolute pressure when the volume is brought to 20 m3 and the temperature to 77 °C?A 100 kPaB 150 kPaC 880 kPaD 1,320 kPa |  |
| 231 01.2-10 | Fundamental law of gases: *pV/T*=constant | C |
|  | A gas takes up 8 m3 at a temperature of 7 °C and at an absolute pressure of 200 kPa. What should the temperature be for the gas to take up a volume of 20 m3 at an absolute pressure of 100 kPa?A 9 °CB 12 °CC 77 °CD 194 °C |  |

| **Knowledge of physics and chemistry****Examination objective 2.1: Gases: partial pressures and mixtures Definitions and simple calculations** |
| --- |
| *Number* | *Source* | *Correct answer* |
|  |  |  |
| 231 02.1-01 | Partial pressure – definitions | B |
|  | What is the definition of the partial pressure of a gas in a gas mixture contained in a cargo tank? |  |
|  | A The pressure indicated on the pressure gaugeB The pressure the gas would have if that gas alone were contained in the cargo tankC The volume the gas would take up if that gas alone were present in the cargo tankD The difference between the pressure of that gas and the atmospheric pressure |  |
| 231 02.1-02 | Partial pressure – definitions | C |
|  | What is the definition of the partial pressure of a gas in a gas mixture contained in a cargo tank? |  |
|  | A The gauge pressure +100 kPaB The volume of that gas at atmospheric pressureC The pressure the gas would have if that gas alone were contained in the cargo tankD The difference between the pressure in the cargo tank and the atmospheric pressure |  |
| 231 02.1-03 | *ptot = ∑pi* and Vol.-% *= pi x 100/ ptot* | D |
|  | A cargo tank contains a mixture of nitrogen and propane. The volume per cent of nitrogen is 20 and the volume per cent of propane is 80. The total pressure in the cargo tank is 500 kPa. What is the partial pressure of the propane? |  |
|  | A 20 kPaB 80 kPaC 320 kPaD 400 kPa |  |
| 231 02.1-04 | *ptot = ∑pi* andVol.-% = *pi x 100/ ptot* | C |
|  | A cargo tank contains a mixture of nitrogen and propane. The nitrogen has a partial pressure of 100 kPa and its volume per cent is 20. What is the partial pressure of the propane? |  |
|  | A 80 kPaB 320 kPaC 400 kPaD 500 kPa |  |
| 231 02.1-05 | *ptot = ∑pi* and Vol.-% = *pi x 100/ ptot* | B |
|  | A gas mixture composed of 70 volume per cent propane and 30 volume per cent butane is contained in a cargo tank at an absolute pressure of 1,000 kPa. What is the partial pressure of the butane? |  |
|  | A 270 kPaB 300 kPaC 630 kPaD 700 kPa |  |
| 231 02.1-06 | Deleted |  |
| 231 02.1-07 | *ptot = ∑pi* and Vol.-% = *pi x 100/ ptot* | B |
|  | A gas mixture composed of propane and butane is contained in a cargo tank at an absolute pressure of 1,000 kPa. The partial pressure of the propane is 700 kPa. What is the volume per cent of the butane? |  |
|  | A 20 volume per centB 30 volume per centC 40 volume per centD 60 volume per cent |  |
| 231 02.1-08 | *ptot = ∑pi* and Vol.-% = *pi x 100/ ptot* | C |
|  | A gas mixture composed of propane, butane and isobutane is contained in a cargo tank at an absolute pressure of 1,000 kPa. The partial pressures of the butane and isobutane are 200 kPa and 300 kPa, respectively. What is the volume per cent of the propane? |  |
|  | A 30 volume per centB 40 volume per centC 50 volume per centD 60 volume per cent |  |
| 231 02.1-09 | *ptot* = *∑pi* and Vol.-% = *pi* *x 100/ ptot* | D |
|  | In a nitrogen/oxygen mixture at an absolute pressure of 2,000 kPa, the partial pressure of the oxygen is 100 kPa. What is the volume per cent of the nitrogen? |  |
|  | A 86 volume per centB 90 volume per centC 90.5 volume per centD 95 volume per cent |  |

| **Knowledge of physics and chemistry** **Examination objective 2.2: Gases: partial pressures and mixturesPressure increase and gas release from cargo tanks** |
| --- |
| *Number* | *Source* | *Correct answer* |
|  |  |  |
| 231 02.2-01 | *ptot = ∑pi* and Vol.-% = *pi x 100/ ptot* and *p \* V* = constant | B |
|  | A cargo tank contains a gas mixture composed of 80 volume per cent propane and 20 volume per cent butane at an absolute pressure of 500 kPa. After pressure relief of cargo tanks (gauge pressure = 0), the absolute pressure in the tank is increased to 400 kPa. What is the volume per cent of the propane now? |  |
|  | A 16 volume per centB 20 volume per centC 25 volume per centD 32 volume per cent |  |
| 231 02.2-02 | *ptot = ∑pi* and Vol.-% = *pi x 100/ ptot* and *p \* V* = constant | D |
|  | A cargo tank with a volume of 300 m3 contains isobutane at an absolute pressure of 150 kPa. Propane that takes up 900 m3 is then also compressed into the tank at an absolute pressure of 100 kPa. What is the volume per cent of the isobutane now? |  |
|  | A 11.1 volume per centB 14.3 volume per centC 20.0 volume per centD 33.3 volume per cent |  |
| 231 02.2-03 | *ptot = ∑pi* and Vol.-% = *pi x 100/ ptot* and *p \* V* = constant | B |
|  | A cargo tank with a volume of 100 m3 contains a gas mixture composed of 50 volume per cent propane and 50 volume per cent propylene, at an absolute pressure of 600 kPa. At constant pressure, nitrogen that takes up 600 m3 is then also compressed into the tank at an absolute pressure of 100 kPa. What is the volume per cent of the propane now? |  |
|  | A 23 volume per centB 25 volume per centC 27 volume per centD 30 volume per cent |  |
| 231 02.2-04 | *ptot = ∑pi* and Vol.-% = *pi x 100/ ptot* and *p \* V* = constant | D |
|  | In a cargo tank filled with air (20 volume per cent oxygen), the absolute pressure is 120 kPa. The absolute pressure is increased, using nitrogen, to 600 kPa. What is the partial pressure of the oxygen in the cargo tank? |  |
|  | A 0.1 kPaB 4.0 kPaC 4.8 kPaD 24 kPa |  |
| 231 02.2-05 | *ptot = ∑pi* and Vol.-% = *pi x 100/ ptot* and *p \* V* = constant | A |
|  | In a cargo tank filled with nitrogen there is an absolute pressure of 50 kPa. An orifice is opened, and outside air containing 20 per cent oxygen enters until the absolute pressure is 100 kPa. What is the partial pressure of the oxygen in the cargo tank? |  |
|  | A 10 kPaB 20 kPaC 40 kPaD 100 kPa |  |
| 231 02.2-06 | *ptot = ∑pi* and Vol.-% = *pi x 100/ ptot* and *p \* V* = constant | C |
|  | A cargo tank contains propane at an absolute pressure of 150 kPa. Using nitrogen, the absolute pressure in the cargo tank is increased to 600 kPa. What is the volume per cent of the propane? |  |
|  | A 8 volume per centB 10 volume per centC 25 volume per centD 30 volume per cent |  |
| 231 02.2-07 | *ptot = ∑pi* and Vol.-% = *pi x 100/ ptot* and *p \* V* = constant | C |
|  | A cargo tank with a volume of 100 m3 contains propane at an absolute pressure of 150 kPa. The absolute pressure of the cargo tank is increased with nitrogen that takes up 450 m3 at an absolute pressure of 100 kPa. What is the volume per cent of the propane? |  |
|  | A 8 volume per centB 10 volume per centC 25 volume per centD 30 volume per cent |  |
| 231 02.2-08 | Characteristics of substances | D |
|  | Which statement is correct for LNG at room temperature and ambient pressure?A The vapour is heavier than airB The vapour is as heavy as the airC Instead of vapour, liquid is releasedD The vapour is lighter than air |  |

| **Knowledge of physics and chemistry****Examination objective 3.1: Avogadro’s number and calculation of masses of ideal gaskmol, kg and pressure at 25 °C** |
| --- |
| *Number* | *Source* | *Correct answer* |
|  |  |  |
| 231 03.1-01 | 1 kmol ideal gas = 24 m3 at 100 kPa and 25 °C, quantity of substance = M \*mass [kg] | B |
|  | A cargo tank has a volume of 72 m3. The tank contains 12 kmol of an ideal gas at a temperature of 25 °C. What is the absolute pressure if it is assumed that 1 kmol ideal gas = 24 m3 at 100 kPa and 25 °C? |  |
|  | A 300 kPaB 400 kPaC 500 kPaD 600 kPa |  |
| 231 03.1-02 | 1 kmol ideal gas = 24 m3 at 100 kPa and 25 °C, quantity of substance = M \*mass [kg] | A |
|  | A cargo tank has a volume of 120 m3. The tank contains 10 kmol of an ideal gas at a temperature of 25 °C. What is the pressure if it is assumed that 1 kmol ideal gas = 24 m3 at 100 kPa and 25 °C? |  |
|  | A 200 kPaB 400 kPaC 500 kPaD 1,200 kPa |  |
| 231 03.1-03 | 1 kmol ideal gas = 24 m3 at 100 kPa and 25 °C, quantity of substance = M \*mass [kg] | B |
|  | A cargo tank has a volume of 120 m3. The tank contains a certain quantity of an ideal gas at a temperature of 25 °C and at an absolute pressure of 300 kPa. What is the quantity of gas if it is assumed that 1 kmol ideal gas = 24 m3 at 100 kPa and 25 °C? |  |
|  | A 5 kmolB 15 kmolC 20 kmolD 30 kmol |  |
| 231 03.1-04 | 1 kmol ideal gas = 24 m3 at 100 kPa and 25 °C, quantity of substance = M \*mass [kg] | A |
|  | In a cargo tank, there is a leakage of 120 m3 of gas UN No. 1978, PROPANE (M=44) at an absolute pressure of 100 kPa and at a temperature of 25 °C. How many kg of propane gas leak into the atmosphere if it is assumed that 1 kmol ideal gas = 24 m3 at 100 kPa and 25 °C? |  |
|  | A 220 kgB 440 kgC 2,880 kgD 5,280 kg |  |
| 231 03.1-05 | 1 kmol ideal gas = 24 m3 at 100 kPa and 25 °C, quantity of substance = M \*mass [kg] | B |
|  | A cargo tank has a volume of 240 m3. How many kg of UN No. 1969, ISOBUTANE (M=58) is there in the cargo tank when the temperature is 25 °C and the absolute pressure is 200 kPa and if it is assumed that 1 kmol ideal gas = 24 m3 at 100 kPa and 25 °C?A 580 kgB 1,160 kgC 1,740 kgD 4,640 kg |  |
| 231 03.1-06 | 1 kmol ideal gas = 24 m3 at 100 kPa and 25 °C, quantity of substance = M \*mass [kg] | C |
|  | A cargo tank has a volume of 120 m3. How many kg of UN No. 1077, PROPANE (M=42) is there in the cargo tank when the temperature is 25 °C and the absolute pressure is 300 kPa and if it is assumed that 1 kmol ideal gas = 24 m3 at 100 kPa and 25 °C?A 210 kgB 420 kgC 630 kgD 840 kg |  |
| 231 03.1-07 | 1 kmol ideal gas = 24 m3 at 100 kPa and 25 °C, quantity of substance = M \*mass [kg] | B |
|  | A cargo tank has a volume of 120 m3. The tank contains 440 kg of gas UN No. 1978, PROPANE (M=44) at a temperature of 25 °C. What is the pressure if it is assumed that 1 kmol ideal gas = 24 m3 at 100 kPa and 25 °C?A 100 kPaB 200 kPaC 1,100 kPaD 1,200 kPa |  |
| 231 03.1-08 | 1 kmol ideal gas = 24 m3 at 100 kPa and 25 °C, quantity of substance = M \*mass [kg] | D |
|  | A cargo tank with a volume of 100 m3 contains 30 kmol of gas UN No. 1978, PROPANE at a temperature of 25 °C. What is the maximum quantity (m3) of propane gas at an absolute pressure of 100 kPa that could leak if it is assumed that 1 kmol ideal gas = 24 m3 at 100 kPa and 25 °C?A 180 m3B 380 m3C 420 m3D 620 m3 |  |
| 231 03.1-09 | 1 kmol ideal gas = 24 m3 at 100 kPa and 25 °C, quantity of substance = M \*mass [kg] | C |
|  | A cargo tank contains 10 kmol of an ideal gas at a temperature of 25 °C and an absolute pressure of 500 kPa. What is the volume of the cargo tank if it is assumed that 1 kmol ideal gas = 24 m3 at 100 kPa and 25 °C? |  |
|  | A 12 m3B 40 m3C 48 m3D 60 m3 |  |
| 231 03.1-10 | 1 kmol ideal gas = 24 m3 at 100 kPa and 25 °C, quantity of substance = M \*mass [kg] | C |
|  | A cargo tank has a volume of 288 m3. The tank contains an ideal gas at an absolute pressure of 400 kPa. What is the quantity of gas in kmol in the cargo tank if it is assumed that 1 kmol ideal gas = 24 m3 at 100 kPa and 25 °C?A 24 kmolB 36 kmolC 48 kmolD 60 kmol |  |

| **Knowledge of physics and chemistry** **Examination objective 3.2: Avogadro’s number and calculation of masses of ideal gasApplication of the mass formula** |
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| *Number* | *Source* | *Correct answer* |
|  |  |  |
| 231 03.2-01 | *m* = 0.12 *\* p \* M \* V / T* | B |
|  | A cargo tank has a volume of 200 m3. What quantity (kg) of UN No. 1005, AMMONIA, ANHYDROUS (M=17) is in the tank when the temperature is 40 °C and the absolute pressure is 300 kPa?A 261 kgB 391 kgC 2,040 kgD 3,060 kg |  |
| 231 03.2-02 | *m* = 0.12 *\** *p \* M \* V / T* | A |
|  | A cargo tank has a volume of 100 m3. What quantity (kg) of UN No. 1010, 1,2-BUTADIENE, STABILIZED (M=54) is in the tank when the temperature is 30 °C and the absolute pressure is 200 kPa?A 428 kgB 642 kgC 4,320 kgD 6,480 kg |  |
| 231 03.2-03 | *m* = 0.12 *\* p \* M \* V / T* | B |
|  | A cargo tank has a volume of 100 m3. What quantity (kg) of UN No. 1978, PROPANE (M=44) is in the tank when the temperature is 20 °C and the absolute pressure is 300 kPa?A 360 kgB 541 kgC 5,280 kgD 7,920 kg |  |
| 231 03.2-04 | *m* = 0.12 *\* p \* M \* V / T* | C |
|  | A cargo tank has a volume of 200 m3. What quantity (kg) of UN No. 1077, PROPYLENE (M=42) is in the tank when the temperature is -5 °C and the absolute pressure is 200 kPa?A 376 kgB 725 kgC 752 kgD 1,128 kg |  |
| 231 03.2-05 | *m* = 0.12 *\* p \* M \* V / T* | A |
|  | A cargo tank has a volume of 200 m3. What quantity (kg) of UN No. 1969, ISOBUTANE (M=56) is in the tank when the temperature is 40 °C and the absolute pressure is 400 kPa?A 1,718 kgB 2,147 kgC 10,080 kgD 12,600 kg |  |
| 231 03.2-06 | *m* = 0.12 *\* p \* M \* V / T* or *p = m \* T / ( 0.12 \* M \* V )* | D |
|  | A cargo tank has a volume of 300 m3. The tank contains 2,640 kg of gas UN No. 1978, PROPANE (M=44) at a temperature of -3 °C. What is the pressure in the cargo tank?A 10 kPaB 110 kPaC 300 kPaD 450 kPa |  |
| 231 03.2-07 | *m* = 0.12 *\* p \* M \* V / T* or *p = m \* T / ( 0.12 \* M \* V )* | D |
|  | A cargo tank has a volume of 100 m3. The tank contains 1,176 kg of gas UN No. 1077, PROPYLENE (M=42) at a temperature of 27 °C. What is the pressure in the cargo tank?A 60 kPaB 190 kPaC 600 kPaD 700 kPa |  |
| 231 03.2-08 | *m* = 0.12 *\* p \* M \* V / T* or *p = m \* T / ( 0.12 \* M \* V )* | C |
|  | A cargo tank has a volume of 450 m3. The tank contains 1,700 kg of gas UN No. 1005, AMMONIA (M=17) at a temperature of 29 °C. What is the absolute pressure in the cargo tank?A 50 kPaB 150 kPaC 560 kPaD 660 kPa |  |
| 231 03.2-09 | *m* = 0.12 *\* p \* M \* V / T* or *p = m \* T / ( 0.12 \* M \* V )* | D |
|  | A cargo tank has a volume of 250 m3. The tank contains 1,160 kg of gas UN No. 1011, BUTANE (M=58) at a temperature of 27 °C. What is the absolute pressure in the cargo tank?A 20 kPaB 100 kPaC 120 kPaD 200 kPa |  |
| 231 03.2-10 | *m* = 0.12 *\* p \* M \* V / T* or *p = m \* T / ( 0.12 \* M \* V )* | D |
|  | A cargo tank has a volume of 200 m3. The tank contains 2,000 kg of gas UN No. 1086, VINYL CHLORIDE (M=62.5) at a temperature of 27 °C. What is the absolute pressure in the cargo tank?A 40 kPaB 140 kPaC 300 kPaD 400 kPa |  |

| **Knowledge of physics and chemistry****Examination objective 4: Density and volume of liquidsDensity and volume under changes in temperature** |
| --- |
| *Number* | *Source* | *Correct answer* |
|  |  |  |
| 231 04.1-01 | *m = ρt1 \* Vt1 = ρt2 \* Vt2* (with tables) | C |
|  | A cargo tank contains 100 m3 of UN No. 1978, PROPANE liquefied at a temperature of -5 °C. The contents are brought to a temperature of 20 °C. The substance then takes up what volume (rounded to the nearest m3)? Use the tablesA 91 m3B 93 m3C 107 m3D 109 m3 |  |
| 231 04.1-02 | *m = ρt1 \* Vt1 = ρt2 \* Vt2* (with tables) | B |
|  | A cargo tank contains 100 m3 of UN No. 1978, PROPANE liquefied at a temperature of 20 °C. The contents are brought to a temperature of ‑5 °C. The substance then takes up what volume (rounded to the nearest m3)? Use the tablesA 91 m3B 93 m3C 107 m3D 109 m3 |  |
| 231 04.1-03 | *m = ρt1 \* Vt1 = ρt2 \* Vt2* (with tables) | C |
|  | A cargo tank contains 100 m3 of UN No. 1010, 1,3-BUTADIENE, STABILIZED liquefied at a temperature of -10 °C. The contents are brought to a temperature of 20 °C. The substance then takes up what volume (rounded to the nearest m3)? Use the tablesA 90 m3B 95 m3C 106 m3D 111 m3 |  |
| 231 04.1-04 | *m = ρt1 \* Vt1 = ρt2 \* Vt2* (with tables) | B |
|  | A cargo tank contains 100 m3 of UN No. 1011, BUTANE liquefied at a temperature of 20 °C. The contents are brought to a temperature of ‑10 °C. The substance then takes up what volume (rounded to the nearest m3)? Use the tablesA 90 m3B 95 m3C 106 m3D 111 m3 |  |
| 231 04.1-05 | *m = ρt1 \* Vt1 = ρt2 \* Vt2* (with tables) | B |
|  | A quantity of liquefied UN No. 1010, BUTADIENE-1-3, STABILIZED takes up a volume of 100 m3 at a temperature of 25 °C. What volume does the substance take up at a temperature of 5 °C (rounded to the nearest m3)? Use the tablesA 93 m3B 96 m3C 104 m3D 107 m3 |  |
| 231 04.1-06 | *m = ρt1 \* Vt1 = ρt2 \* Vt2* (with tables) | C |
|  | A quantity of liquefied UN No. 1010, BUTADIENE-1-3, STABILIZED takes up a volume of 100 m3 at a temperature of 5 °C. What volume does the substance take up at a temperature of 25 °C (rounded to the nearest m3)? Use the tablesA 93 m3B 96 m3C 104 m3D 107 m3 |  |
| 231 04.1-07 | *m = ρt1 \* Vt1 = ρt2 \* Vt2* (with tables) | C |
|  | A quantity of liquefied UN No. 1969, ISOBUTANE takes up a volume of 100 m3 at a temperature of -10 °C. What volume does the substance take up at a temperature of 30 °C (rounded to the nearest m3)? Use the tablesA 87 m3B 92 m3C 109 m3D 115 m3 |  |
| 231 04.1-08 | *m = ρt1 \* Vt1 = ρt2 \* Vt2* (with tables) | B |
|  | A quantity of liquefied UN No. 1969, ISOBUTANE takes up a volume of 100 m3 at a temperature of 30 °C. What volume does the substance take up at a temperature of -10 °C (rounded to the nearest m3)? Use the tablesA 87 m3B 92 m3C 108 m3D 115 m3 |  |
| 231 04.1-09 | *m = ρt1 \* Vt1 = ρt2 \* Vt2* (with tables) | C |
|  | A quantity of liquefied UN No. 1077, PROPYLENE takes up a volume of 100 m3 at a temperature of -10 °C. What volume does the substance take up at a temperature of 25 °C (rounded to the nearest m3)? Use the tablesA 88 m3B 90 m3C 111 m3D 113 m3 |  |
| 231 04.1-10 | *m = ρt1 \* Vt1 = ρt2 \* Vt2* (with tables) | B |
|  | A quantity of liquefied UN No. 1077, PROPYLENE takes up a volume of 100 m3 at a temperature of 25 °C. What volume does the substance take up at a temperature of -10 °C (rounded to the nearest m3)? Use the tablesA 88 m3B 90 m3C 111 m3D 113 m3 |  |

| **Knowledge of physics and chemistry****Examination objective 5: Critical pressure and temperature** |
| --- |
| *Number* | *Source* | *Correct answer* |
|  |  |  |
| 231 05.0-01 | Critical pressure and temperature | A |
|  | UN No. 1978, PROPANE has a critical temperature of 97 °C, a boiling point of -42 °C and a critical pressure of 4,200 kPa. Which is the only case in which it is possible to liquefy the propane by increasing the pressure?A A temperature under 97 °CB A temperature over -97 °CC A pressure over 4,200 kPaD A pressure greater than atmospheric pressure |  |
| 231 05.0-02 | Critical pressure and temperature | C |
|  | UN No. 1086 VINYL CHLORIDE, STABILIZED has a critical pressure of 5,600 kPa, a boiling point of -14 °C and a critical temperature of 156.6 °C. Which of the following is correct?A Vinyl chloride may be transported at ambient temperature, including in pressure tanks, only in gaseous stateB Vinyl chloride can be liquefied only at ambient temperature and a pressure over 5,600 kPaC Vinyl chloride may be transported at atmospheric pressure in the liquid state below the boiling pointD Vinyl chloride can be liquefied only at a temperature over 156.6 °C |  |
| 231 05.0-03 | Critical pressure and temperature | B |
|  | UN No. 1011 BUTANE has a boiling point of 0 °C, a critical temperature of 153 °C and a critical pressure of 3,700 kPa. Which of the following is correct?A Butane may be transported in the liquid state at a temperature over 153 °C |  |
|  | B Butane may be liquefied by increasing the pressure at a temperature under 153 °C |  |
|  | C Butane can be liquefied only at a pressure over 3,700 kPaD Butane cannot be liquefied by refrigeration |  |
| 231 05.0-04 | Critical pressure and temperature  | A |
|  | UN No. 1005 AMMONIA, ANHYDROUS has a critical temperature of 132 °C, a critical pressure of 11,500 kPa and a boiling point of -33 °C. In which of the following conditions is the only one in which it is possible to liquefy the ammonia?A Increase of pressure at a temperature under 132 °CB Increase of pressure at a temperature over 132 °CC Pressure over 11,500 kPaD Pressure over 100 kPa |  |

| **Knowledge of physics and chemistry****Examination objective 6.1: PolymerizationTheoretical questions** |
| --- |
| *Number* | *Source* | *Correct answer* |
|  |  |  |
| 231 06.1-01 | Polymerization | C |
|  | What is polymerization?A A chemical reaction during which a substance burns in the air, releasing heatB A chemical reaction during which a chemical bond spontaneously decomposes, producing gasC A chemical reaction during which a substance’s molecules bind, releasing heatD A chemical reaction during which a substance reacts with water while producing heat |  |
| 231 06.1-02 | Polymerization | A |
|  | How is polymerization triggered?A By the presence of oxygen or another generator of radicals |  |
|  | B By too low pressure |  |
|  | C By the presence of water in the substance subject to polymerizationD By high-speed pumping of the substance subject to polymerization in the cargo tank |  |
| 231 06.1-03 | Polymerization | B |
|  | What is a characteristic of spontaneous polymerization?A Formation of vapourB Temperature increase of the liquidC Temperature decrease of the liquidD Falling pressure of the gaseous phase |  |
| 231 06.1-04 | Polymerization | B |
|  | What is the hazard in the event of uncontrolled polymerization of a liquid? |  |
|  | A Freezing of the level indicator float |  |
|  | B Explosion due to a significant release of heat |  |
|  | C Cracks forming in the walls of the cargo tankD Depression in the cargo tanks |  |
| 231 06.1-05 | Polymerization | D |
|  | Spontaneous, uncontrolled polymerization of a liquid in a cargo tank can lead to what?A DeflagrationB No reactionC Ullage in the cargo tank |  |
|  | D Explosion due to a significant release of heat |  |

| **Knowledge of physics and chemistry** **Examination objective 6.2: PolymerizationPractical questions, conditions of carriage** |
| --- |
| *Number* | *Source* | *Correct answer* |
|  |  |  |
| 231 06.2-01 | 3.2.3.2, Table C | C |
|  | Table C of 3.2.3.2 contains “UN No. 1010, BUTADIENE-1-3, STABLIZED” What is the meaning of “STABILIZED”? |  |
|  | A During transport the product should not be subject to excessive shakingB The product is stable in all circumstancesC Measures have been taken to stop polymerization during transportD BUTADIENE-1-3 is a product that involves no risk |  |
| 231 06.2-02 | Polymerization | C |
|  | When unstabilized vinyl chloride is transported, polymerization is always a possibility. How can it be prevented? |  |
|  | A By loading slowlyB By loading the product in a pressure tank at high temperatureC By adding a stabilizer and/or maintaining low oxygen content in the cargo tankD By adding a stabilizer when the oxygen content in the cargo tank is 20.0% volume |  |
| 231 06.2-03 | Polymerization | D |
|  | Why is it necessary to transport a mixture of UN No. 1010, BUTADIENE-1-3, STABILIZED and hydrocarbons with a stabilizer?A Because of high water concentrationB Because of high concentration of isobutane and butyleneC Because of the presence of solidsD Because of the high butadiene concentration |  |
| 231 06.2-04 | Polymerization | A |
|  | What is the function of a stabilizer?A Prevent polymerizationB Interrupt polymerization by reducing temperatureC Exclude the possibility of a deflagrationD Exclude the possibility of dilation in a liquid |  |
|  |  |  |
| 231 06.2-05 | 3.2.3.2, Table C | A |
|  | A substance must be transported with a stabilizer. When can such transport take place?A When there is an entry in the transport document mentioning what stabilizer has been added and at what concentrationB When the right stabilizer is on board in a sufficient quantity to be added if necessary during transportC When a sufficient quantity of stabilizer has been added immediately after loadingD When the cargo is sufficiently hot to absorb the stabilizer |  |
| 231 06.2-06 | 3.2.3.2, Table C | D |
|  | Certain substances must be stabilized. In ADN, the requirements for stabilization appear where? |  |
|  | A In section 2.2.2, Gas |  |
|  | B In section 8.6.3, ADN checklist |  |
|  | C In section 3.2.1, Table A and in the explanations for this tableD In subsection 3.2.3.2, Table C and in the explanations for this table |  |
| 231 06.2-07 | Polymerization | B |
|  | What is an indication that a substance is in the process of polymerizing?A Decrease in pressure in the cargo tankB Increase in temperature of the liquidC Decrease in temperature of the vapourD Decrease in temperature of the liquid |  |
| 231 06.2-08 | Deleted (2007) |  |
| 231 06.2-09 | Polymerization | C |
|  | A sufficient concentration of stabilizer is diluted in a liquid prone to polymerization. Is the liquid then stabilized indefinitely?A Yes, as the stabilizer itself is stableB Yes, as there is no oxygenC No, as the stabilizer is always slowly consumedD No, as the stabilizer collects on the walls of the cargo tank and loses its effect |  |

| **Knowledge of physics and chemistry** **Examination objective 7.1: Evaporation and condensationDefinitions, etc.** |
| --- |
| *Number* | *Source* | *Correct answer* |
|  |  |  |
| 231 07.1-01 | Vapour pressure | A |
|  | The vapour pressure of a liquid is dependent on what?A Temperature of the liquidB Atmospheric pressureC Volume of the liquidD External temperature |  |
| 231 07.1-02 | Vapour pressure | B |
|  | The vapour pressure of a liquid is dependent on what?A Mass of the liquidB Temperature of the liquidC Contents of the cargo tankD Vapour/liquid ratio in the cargo tank |  |
| 231 07.1-03 | Vapour pressure | C |
|  | When does vapour condense?A When the vapour pressure is higher than atmospheric pressureB When the vapour pressure is lower than atmospheric pressureC When the vapour pressure is higher than the vapour saturation pressureD When the vapour pressure is lower than the vapour saturation pressure |  |
| 231 07.1-04 | Vapour pressure | D |
|  | What is a saturated vapour?A A vapour whose temperature is identical to that of the evaporating liquidB A vapour whose pressure is less than the vapour saturation pressure C A vapour whose pressure is higher than the vapour saturation pressureD A vapour whose pressure is equal to the vapour saturation pressure |  |
| 231 07.1-05 | Vapour pressure | A |
|  | When does a liquid evaporate?A When the vapour pressure is less than the vapour saturation pressureB When the vapour pressure is equal to the vapour saturation pressureC When the vapour pressure is higher than the vapour saturation pressureD When the vapour pressure is higher than atmospheric pressure |  |
| 231 07.1-06 | Vapour pressure | B |
|  | A cargo tank has for some time held propane vapour and a small quantity of liquid propane at the bottom of the tank. Which of the following statements is correct?A The vapour pressure is less than the propane vapour saturation pressureB The vapour pressure is equal to the propane vapour saturation pressureC The vapour pressure is higher than the propane vapour saturation pressureD The vapour pressure is equal to atmospheric pressure |  |
| 231 07.1-07 | Vapour pressure | C |
|  | Vapour is drawn from a cargo tank containing liquid propane. What happens in the cargo tank once the drawing stops?A The vapour pressure will decreaseB The vapour pressure will remain constantC The vapour pressure will increaseD The vapour temperature will increase |  |
| 231 07.1-08 | Vapour pressure | D |
|  | With the use of a compressor, propane vapour from cargo tank No. 3 is injected into cargo tank No. 2, containing liquid propane. What will happen in cargo tank No. 2 once the compressor stops?A The temperature of the liquid will decreaseB The vapour pressure will increaseC The vapour pressure will remain constantD The vapour pressure will decrease |  |
| 231 07.1-09 | Vapour pressure | A |
|  | Liquid propane is pumped out of a cargo tank. What will happen in this cargo tank after the pumping stops?A The vapour pressure will increaseB The vapour pressure will remain constantC The temperature of the liquid will increaseD The temperature of the liquid will remain constant |  |
| 231 07.1-10 | Vapour pressure | B |
|  | Liquid propane is pumped into a cargo tank containing nitrogen at an absolute pressure of 100 kPa. What will happen to the liquid propane in this tank?A The temperature of the propane will increaseB The temperature of the propane will decreaseC The temperature of the propane will remain constantD The propane will solidify |  |
| 231 07.1-11 | Influence on the cargo of an increase in temperature | B |
|  | What happens when the temperature of refrigerated liquefied gas increases in the cargo tank?A The level of filling of the liquid increases and the pressure dropsB The level of filling of the liquid and the pressure increase and may result in a “boil-off”C The pressure increases and the “boil-off” condensesD The pressure increases and the level of the liquid decreases |  |
| 231 07.1-12 | Change in inside cargo temperature, general knowledge | B |
|  | An insulated cargo tank is filled with LNG at a temperature of -162 °C. Which of the following has no effect on the conservation period?A The heat transmission value according to 9.3.1.27.9B The diameter of the gas evacuation tubeC The safety valve activation pressureD The ambient temperature according to 9.3.1.24.2 |  |
| 231 07.1-13 | Characteristics of substances, 1.2.1 | A |
|  | Describe the term “boil-off” as it is used in ADN. A Vapour produced over the surface of a boiling cargo due to evaporationB Any temperature of a liquid above its normal boiling pointC Quantity of vapour that escapes through safety valves when the pressure becomes too great in a cargo tankD Vapour produced when there is strong evaporation of a liquid at the beginning of loading in an empty cargo tank containing only nitrogen |  |
| 231 07.1-14 | Characteristics of substances | B |
|  | Why is it that methane cannot be liquefied at a temperature of 20 °C? |  |
|  | A The critical temperature of methane is higher than the ambient temperatureB The critical temperature of methane is lower than the ambient temperatureC The pressure would reach a too high level regardless of the cargo tank or the substance usedD Methane can be liquefied at ambient temperature: it is called compressed natural gas (CNG) |  |

|  **Knowledge of physics and chemistry****Examination objective 7.2: Evaporation and condensationSaturation at vapour pressure** |
| --- |
| *Number* | *Source* | *Correct answer* |
|  |  |  |
| 231 07.2-01 | Deleted (2007) |  |
| 231 07.2-02 | Deleted (2007) |  |
| 231 07.2-03 | Increase in temperature in the cargo tank | C |
|  | A cargo tank is filled to 91% with UN No. 1010, BUTADIENE-1-3, STABILIZED, at a temperature of 15 °C. The absolute pressure is 400 kPa, which is above the vapour saturation pressure. Where does this pressure come from?A A stabilizerB The fact that it takes 48 hours to reach equilibriumC The presence of nitrogenD The fact that the loading took place too slowly |  |
| 231 07.2-04 | Pressure in the cargo tank | D |
|  | A type G tank vessel is loaded with UN No. 1077, PROPYLENE (M=42). A quantity of 1 m3 of liquid escapes from a pressure tank (d=600 kg/m3). Approximately how much propane vapour forms at ambient temperature of 20 °C? |  |
|  | A 12 m3B 24 m3C 150 m3D 340 m3 |  |
| 231 07.2-05 | Behaviour of pressure in the cargo tank | C |
|  | A cargo tank contains nitrogen at an absolute pressure of 100 kPa at a temperature of 5 °C. Without removing the nitrogen the absolute pressure in the cargo tank is brought to 300 kPa by adding isobutane vapour with the use of a compressor. The compressor is stopped. What happens in the cargo tank? (For information: isobutane’s vapour saturation pressure at 5 °C is 186 kPa).A The pressure increases in the cargo tankB The pressure remains constant in the cargo tankC The pressure decreases in the cargo tank and liquid formsD Both the isobutane vapour and the nitrogen vapour condense |  |
| 231 07.2-06 | Behaviour of pressure in the cargo tank | D |
|  | A cargo tank contains nitrogen at an absolute pressure of 100 kPa and at a temperature of 20 °C. Without vapour return, the cargo tank is filled to 80% with UN No. 1969, ISOBUTANE at 20 °C. What happens with the absolute pressure in the cargo tank? (For information: isobutane’s vapour saturation pressure at 20 °C is 300 kPa)A The absolute pressure in the cargo tank is then 500 kPaB The absolute pressure in the cargo tank is then under 500 kPaC The absolute pressure in the cargo tank is then 300 kPa because all the nitrogen dissolves in the liquidD The absolute pressure in the cargo tank is then over 500 kPa |  |
| 231 07.2-07 | Deleted (2007) |  |
| 231 07.2-08 | Vapour saturation pressure | B |
|  | A cargo tank contains propane vapour at an absolute pressure of 550 kPa and at a temperature of 20 °C. To which temperature may the tank be cooled without causing condensation? (For information: propane’s vapour saturation pressure at 20 °C is 550 kPa)A -80 °CB 5 °CC 12 °CD 13 °C |  |
| 231 07.2-09 | Liquefying of gas | A |
|  | At 100 kPa, 9,000 m3 of vinyl chloride vapour (M=62) is liquefied by compression at 25 °C. Approximately how many m3 of liquid (d=900 kg/m3) will result if it is assumed that 1 kmol ideal gas = 24 m3 at 100 kPa and 25 °C? |  |
|  | A 25 m3B 375 m3C 1,000 m3D 3,000 m3 |  |

| **Knowledge of physics and chemistry** **Examination objective 8.1: MixturesVapour pressure and composition** |
| --- |
| *Number* | *Source* | *Correct answer* |
|  |  |  |
| 231 08.1-01 | Saturation vapour pressure, depending on composition | B |
|  | Which of the following statements relating to the vapour pressure of a propane/butane mixture is correct?A The vapour pressure of the mixture is less than that of butaneB The vapour pressure of the mixture is greater than that of butaneC The vapour pressure of the mixture is equal to that of butaneD The vapour pressure of the mixture is greater than that of propane |  |
| 231 08.1-02 | Saturation vapour pressure, depending on composition | C |
|  | Which of the following statements relating to the vapour pressure of a 60% propylene and 40% propane mixture is correct?A The vapour pressure of the mixture is greater than that of propyleneB The vapour pressure of the mixture is equal to that of propyleneC The vapour pressure of the mixture is less than that of propyleneD The vapour pressure of the mixture is equal to that of propane |  |
| 231 08.1-03 | Saturation vapour pressure, depending on composition | A |
|  | A propylene mixture contains 7% propane. Which of the following statements relating to the vapour pressure of this mixture is correct?A The vapour pressure of the mixture is less than that of propyleneB The vapour pressure of the mixture is equal to that of propyleneC The vapour pressure of the mixture is greater than that of propyleneD The vapour pressure of the mixture is less than that of propane |  |
| 231 08.1-04 | Deleted (2007) |  |
| 231 08.1-05 | Deleted (2007) |  |
| 231 08.1-06 | Deleted (2007) |  |

| **Knowledge of physics and chemistry** **Examination objective 8.2: MixturesHazard characteristics** |
| --- |
| *Number* | *Source* | *Correct answer* |
|  |  |  |
| 231 08.2-01 | Health risks | C |
|  | Which of the following substances is comparable to a mixture of liquefied propane and butane gas from the point of view of health hazards?A UN No. 1005, AMMONIA, ANHYDROUSB UN No. 1010, BUTADIENE-1-3, STABILIZEDC UN No. 1879, PROPANED UN No. 1086, VINYL CHLORIDE, STABILIZED |  |
| 231 08.2-02 | Health risks | B |
|  | During transport of a mixture of liquefied gases composed of propane and butane, the same safety requirements must be followed as during transport of another gas. Which gas?A UN No. 1010, BUTADIENE-1-3, STABILIZEDB UN No. 1969, ISOBUTANEC UN No. 1280, PROPYLENE OXIDED UN No. 1086, VINYL CHLORIDE, STABILIZED |  |
| 231 08.2-03 | Health risks | B |
|  | Which of the following substances is comparable to UN No. 1965, HYDROCARBON GAS MIXTURE, LIQUEFIED, N.O.S., (MIXTURE A) from the point of view of health hazards?A UN No. 1010, BUTADIENE-1-3, STABILIZEDB UN No. 1969, ISOBUTANEC UN No. 1280, PROPYLENE OXIDED UN No. 1086, VINYL CHLORIDE, STABILIZED |  |
| 231 08.2-04 | Health risks | C |
|  | During transport of UN No. 1965, MIXTURE A the same safety requirements must be followed as during transport of another gas. Which gas?A UN No. 1005, AMMONIA, ANHYDROUSB UN No. 1010, BUTADIENE-1-3, STABILIZEDC UN No. 1969, ISOBUTANED UN No. 1280, PROPYLENE OXIDE |  |
| 231 08.2-05 | Health risks | A |
|  | What hazard is characteristic of a mixture of liquefied gases composed of propane and butane?A FlammabilityB ToxicityC PolymerizationD No danger |  |
| 231 08.2-06 | Hazard characteristics | C |
|  | What hazard is characteristic of UN No. 1965, HYDROCARBON GAS MIXTURE, LIQUEFIED, N.O.S.?A The mixture is not dangerousB The mixture is toxicC The mixture is flammableD The mixture may polymerize |  |
| 231 08.2-07 | Hazard characteristics | C |
|  | What hazard is characteristic of a mixture of butane and butylene (UN No. 1965)?A No dangerB ToxicityC FlammabilityD Polymerization |  |
| 231 08.2-08 | Hazard characteristics | C |
|  | What hazard is characteristic of UN No. 1063, METHYL CHLORIDE (REFRIGERANT GAS R 40)?A The mixture is not dangerousB The mixture is toxicC The mixture is flammableD The mixture may polymerize |  |
| 231 08.2-09 | Characteristics of substances | D |
|  | Why are substances that enter into contact with LNG subject to special requirements?A Because of the low densityB Because of the low pressureC Because of the low molar massD Because of the low temperature |  |
| 231 08.2-10 | Characteristics of substances | C |
|  | What substance involves the greatest risk of brittle fracture in the event of a leak?A Propylene oxideB Gasoline, motor spirit and petrolC LNGD Butane |  |
| 231 08.2-11 | Characteristics of substances | A |
|  | Which of the following is true about LNG in a non-refrigerated cargo tank?A The less liquid there is in the cargo tank, the faster the temperature risesB The less liquid there is in the cargo tank, the slower the temperature risesC The temperature drops progressively as the quantity of liquid in the cargo tank is reducedD The temperature remains constant regardless of whether there is much or little liquid in the cargo tank |  |

|  **Knowledge of physics and chemistry****Examination objective 9: Chemical bonds and formulae** |
| --- |
| *Number* | *Source* | *Correct answer* |
|  |  |  |
| 231 09.0-01 | Polymerization | A |
|  | Which of the following substances has a risk of polymerization?A UN No. 1010, BUTADIENE-1-3, STABILIZEDB UN No. 1012, BUTYLENE-1C UN No. 1012, BUTYLENE-2D UN No. 1969, ISOBUTANE |  |
| 231 09.0-02 | Molecular mass | D |
|  | What is the molecular mass of a substance with the formula: CH2=CCl2? (The relative atomic mass of carbon is 12, of hydrogen is 1 and of chlorine is 35.5)  |  |
|  | A 58B 59C 62.5D 97 |  |
| 231 09.0-03 | Molecular mass | C |
|  | What is the molecular mass of a substance with the formula: CH3-CO-CH3? (The relative atomic mass of carbon is 12, of hydrogen is 1 and of oxygen is 16.) |  |
|  | A 54B 56C 58D 60 |  |
| 231 09.0-04 | Molecular mass | B |
|  | What is the molecular mass of a substance with the formula: CH3Cl? (The relative atomic mass of carbon is 12, of hydrogen is 1 and of chlorine is 35.5.)A 28.0B 50.5C 52.5D 54.5 |  |
| 231 09.0-05 | Molecular mass | A |
|  | What is the molecular mass of a substance with the formula: CH2=C(CH3)-CH=CH2? (The relative atomic mass of carbon is 12 and of hydrogen is 1.) A 68B 71C 88D 91 |  |
| 231 09.0-06 | Deleted (2007) |  |
| 231 09.0-07 | Deleted (2007) |  |
| 231 09.0-08 | Molecular mass | A |
|  | What is the molecular mass of a substance with the formula: CH3-CH(CH3)-CH3? (The relative atomic mass of carbon is 12 and of hydrogen is 1.) |  |
|  | A 58B 66C 68D 74 |  |

|  **Practice** **Examination objective 1.1: FlushingFlushing in the event of a change of cargo** |
| --- |
| *Number* | *Source* | *Correct answer* |
|  |  |  |
| 232 01.1-01 | Flushing in the event of a change of cargo | C |
|  | The cargo tanks of a vessel contain propylene vapour at an absolute pressure of 120 kPa with no liquid. The vessel is to be loaded with propane. How should the loading begin?A The cargo tanks should be flushed with nitrogen until the propylene content is less than 10% volumeB The cargo tanks should be flushed with propane vapour until the propylene content is less than 10% volumeC In such a way as to prevent extremely low temperatures from being reachedD To avoid low temperatures, loading should be done very slowly |  |
| 232 01.1-02 | Flushing in the event of a change of cargo | C |
|  | The cargo tanks of a vessel contain propylene vapour at an absolute pressure of 120 kPa with no liquid. The vessel is to be loaded with a mixture of propylene and propane. How should the loading begin?A The cargo tanks should be flushed with nitrogen until the propylene content is less than 10% volumeB The cargo tanks should be flushed with vapour from the mixture until the propylene content is less than 10% volumeC In such a way as to prevent extremely low temperatures from being reachedD To avoid low temperatures, loading should be done very slowly |  |
| 232 01.1-03 | Table C, column (20), remark 2 | A |
|  | The cargo tanks of a vessel contain butane vapour at an absolute pressure of 120 kPa with no liquid. The vessel is to be loaded with UN No. 1010, 1,3-BUTADIENE, STABILIZED. What should be done before the loading?A The cargo tanks should be flushed with nitrogen until the butane content corresponds to the consignor’s or consignee’s instructionsB The cargo tanks should be flushed with butadiene vapour until the butane content corresponds to the consignor’s or consignee’s instructionsC A cargo tank with butadiene should be filled until an absolute pressure of approximately 300 kPa is obtained in the cargo tank |  |
|  | D The cargo tanks should be directly loaded with liquid butadiene |  |
| 232 01.1-04 | Flushing in the event of a change of cargo | A |
|  | The cargo tanks of a vessel contain butane vapour at an absolute pressure of 120 kPa with no liquid. The vessel is to be loaded with UN No. 1086, VINYL CHLORIDE, STABILIZED. How should the loading begin?A The cargo tanks should be thoroughly cleanedB The cargo tanks should be flushed with vinyl chloride vapour until the butane content is 0% volume (no longer detectable)C A cargo tank should be filled with vinyl chloride until an absolute pressure of approximately 400 kPa is obtained in the cargo tankD The cargo tanks should be directly loaded with vinyl chloride liquid |  |
| 232 01.1-05 | Flushing in the event of a change of cargo | D |
|  | The cargo tanks of a vessel contain propane vapour at an absolute pressure of 120 kPa with no liquid. The vessel is to be loaded with butane. How should the loading begin?A The cargo tanks should be flushed with nitrogen until the propane content is less than 10% volumeB The cargo tanks should be flushed with butane vapour until the propane content is less than 10% volumeC One cargo tank should be filled with butane vapour until an absolute pressure of approximately 300 kPa is obtained in the tankD The cargo tanks should be directly loaded with liquid butane |  |
| 232 01.1-06 | 9.3.1.21.12 | C |
|  | Following an extended period of maintenance, a vessel used for transporting refrigerated liquefied gases is to be loaded for the first time with refrigerated liquefied gas. What procedure should be followed?A Load the cargo, but more slowly than usual, as the cargo tanks have been warmedB Load the cargo normally; the cargo tanks are cooled by the cargoC Load the cargo after pre-cooling according to the written procedure D Load the cargo, but faster than usual |  |

|  **Practice** **Examination objective 1.2: FlushingAddition of air to the cargo** |
| --- |
| *Number* | *Source* | *Correct answer* |
|  |  |  |
| 232 01.2-01 | Table C, column (20), remark 2 | D |
|  | A vessel is to be loaded with UN No. 1978, PROPANE. The cargo tanks contain air. How should the loading begin?A The cargo tanks should be directly filled with propane vapourB Air from the cargo tanks should be removed by means of propane vapourC By reducing the oxygen content in the cargo tank and the corresponding piping to 16% volume by flushing with nitrogenD By reducing the oxygen content in the cargo tank and the corresponding piping to the level corresponding to the consignor’s or consignee’s instructions by flushing with nitrogen |  |
| 232 01.2-02 | Table C, column (20), remark 2 | C |
|  | A vessel is to be loaded with UN No. 1077, PROPYLENE. The cargo tanks contain air. What should be done before the loading?A The cargo tanks should be directly filled with propylene vapourB Air should be removed from the cargo tanks and the corresponding piping by means of propylene vapourC By reducing the oxygen content in the cargo tank and the corresponding piping to the level corresponding to the consignor’s or consignee’s instructions by flushing with nitrogenD By reducing the oxygen content in the cargo tank and the corresponding piping to 16% volume by flushing with nitrogen |  |
| 232 01.2-03 | Table C, column (20), remark 2 | B |
|  | A vessel has just left the shipyard. The cargo tanks have been open. The valves are closed. The vessel is to be loaded with UN No. 1011, BUTANE. What should be done before the loading?A The cargo tanks should be flushed with nitrogen until the condensation point is below the required valueB The cargo tanks and the corresponding piping should be flushed with nitrogen until the oxygen content in the cargo tanks and the corresponding piping has been reduced to the value required by the consignor or consignee |  |
|  | C The cargo tanks and the corresponding piping should be flushed with nitrogen until the oxygen content in the cargo tanks has been reduced to 16% volume |  |
|  | D Butane vapour should be directly introduced into the cargo tanks |  |
| 232 01.2-04 | Table C, column (20), remark 2 | B |
|  | A vessel has just left the shipyard. The cargo tanks have been open. The valves are closed. The vessel is to be loaded with UN No. 1077, PROPYLENE. What should be done before the loading?A The cargo tanks should be directly loaded with propyleneB The cargo tanks and the corresponding piping should be flushed with nitrogen until the oxygen content in the cargo tanks and the corresponding piping has been reduced to the value required by the consignor or consigneeC The cargo tanks should be flushed with nitrogen until the oxygen content in the cargo tanks and the corresponding piping has been reduced to 16% volumeD Propylene vapour should be directly introduced into the cargo tanks |  |
| 232 01.2-05 | Table C, column (20), remark 2 | C |
|  | A vessel is to be loaded with UN No. 1969, ISOBUTANE. The cargo tanks contain completely dry air at an absolute pressure of 110 kPa. What should be done before the loading?A Isobutane should be introduced into the cargo tanks until the absolute pressure reaches 300 kPaB Air should be removed from the cargo tanks by means of longitudinal flushing with isobutane vapourC The cargo tanks and the corresponding piping should be flushed with nitrogen until the oxygen content in the cargo tanks and the corresponding piping has been reduced to the value required by the consignor or consigneeD The cargo tanks should be flushed with nitrogen until the oxygen content in the cargo tanks has been reduced to 0.2% volume |  |

|  **Practice** **Examination objective 1.3: FlushingMethods for flushing (degassing) before entering cargo tanks** |
| --- |
| *Number* | *Source* | *Correct answer* |
|  |  |  |
| 232 01.3-01 | Methods for flushing (degassing) | D |
|  | A cargo tank contains propane vapour, with no liquid, and is relieved of pressure. Which of the following methods for flushing under pressure with nitrogen results in the lowest final concentration? |  |
|  | A Setting the absolute pressure to 800 kPa once, then releasing the pressureB Setting the absolute pressure to 400 kPa twice, then releasing the pressureC Setting the absolute pressure to 300 kPa three times, then releasing the pressureD Setting the absolute pressure to 200 kPa five times, then releasing the pressure |  |
| 232 01.3-02 | Methods for flushing (degassing) | D |
|  | A cargo tank contains propane vapour, with no liquid, and the cargo tank is relieved of pressure. A propane concentration of less than 0.5% volume should be obtained. Which of the following methods for flushing uses the least nitrogen?A Setting the absolute pressure to 600 kPa three times, then releasing the pressureB Setting the absolute pressure to 400 kPa four times, then releasing the pressureC Setting the absolute pressure to 300 kPa five times, then releasing the pressureD Setting the absolute pressure to 200 kPa eight times, then releasing the pressure |  |
| 232 01.3-03 | Methods for flushing (degassing) | C |
|  | What does longitudinal flushing mean?A Raising the pressure in a cargo tank, then releasing the pressureB Simultaneously raising the pressure in several cargo tanks with nitrogenC Continually adding nitrogen to the cargo tank(s) and simultaneously releasing the overpressureD Simultaneously raising the pressure with nitrogen in the port and starboard cargo tanks  |  |
| 232 01.3-04 | Methods for flushing (degassing) | A |
|  | What does flushing under pressure mean?A A repeated raising of pressure in one or more cargo tanks with nitrogen, followed by a release of pressureB An uninterrupted flow of nitrogen through several cargo tanks in a lineC An interrupted flow of nitrogen through a cargo tankD An interrupted flow of nitrogen at high pressure through one or more cargo tanks |  |
| 232 01.3-05 | Flushing (degassing) at the same time as repairs | B |
|  | A vessel has just transported propane and has to go to the yard for repairs to the cargo tanks. With what do the cargo tanks have to be flushed?A With nitrogen onlyB First with nitrogen and then with airC With air onlyD No flushing is necessary |  |
| 232 01.3-06 | Flushing (degassing) in connection with repair work | C |
|  | A vessel has previously carried propane and is headed for the shipyard for soldering work on its cargo tanks. With what must the cargo tanks and piping be flushed?A No flushing is requiredB First with air and then with nitrogenC First with nitrogen and then with airD Only with nitrogen |  |
| 232 01.3-07 | 7.2.3.1.6 | B |
|  | A vessel has carried butane. Empty cargo tanks are to be entered without a self-contained breathing apparatus. How should the cargo tanks be flushed?A With nitrogen until the concentration of butane is no more than 1% volumeB First with nitrogen, then with air until the oxygen content is between 20 and 23.5% volumeC First with nitrogen, then with air, until the oxygen content reaches 16% volumeD Directly with air until the oxygen content reaches 20% volume |  |
| 232 01.3-08 | Longitudinal flushing | C |
|  | Why is longitudinal flushing an efficient method for flushing cargo tanks?A Because with a relatively weak flow of nitrogen, the heavier gas of the chemical to be vented is completely flushed out by the nitrogen and only a volume of nitrogen equal to the volume of the tank is thus usedB Because with a relatively large flow of nitrogen, the gas and the nitrogen are completely mixed so that a considerable quantity of nitrogen is used, but the task is quickly doneC Because the substituting of the gas with nitrogen in the initial stage and the mixing of the two gases in the final stage means less nitrogen is used than when flushing under pressureD Because it allows for advance calculation of the final concentration in the cargo tank of the gas to be vented, after a specific time period |  |
| 232 01.3-09 | Deleted (2007) |  |

|  **Practice****Examination objective 2: Sampling** |
| --- |
| *Number* | *Source* | *Correct answer* |
|  |  |  |
| 232 02.0-01 | Deleted (2010) |  |
| 232 02.0-02 | Deleted (2010)  |  |
| 232 02.0-03 | Flushing/rinsing of test tubes | D |
|  | What should be done with a test tube before a representative sample of liquid may be taken?A The test tube should be rinsed with waterB The test tube should be flushed with dry airC The test tube should be flushed 10 times with gas then plunged into water D The test tube should be rinsed with the liquid to be sampled |  |
| 232 02.0-04 | Flushing/rinsing of test tubes | A |
|  | What should be done with a test tube before a representative sample may be taken of the gaseous phase?A The test tube should be flushed with the gas to be sampledB The test tube should first be filled with the liquid form of the chemicalC The test tube should be rinsed with a liquidD The test tube should be rinsed with water |  |
| 232 02.0-05 | Sampling during longitudinal flushing | C |
|  | A tank vessel was previously loaded with UN No. 1011 BUTANE. The cargo tanks are empty and have not been cleaned. They are flushed using the longitudinal flushing method. Where is the highest concentration of butane measured during the flushing?A High up in the cargo tankB Halfway up the cargo tankC At the bottom of the cargo tankD In the gas piping |  |
| 232 02.0-06 | Deleted (2007) |  |
| 232 02.0-07 | 7.2.4.1.1 Storage of samples in test tubes | A |
|  | Where should a test tube used to sample a liquid be stored?A In a protected location above deck in the cargo areaB In a cool location outside the cargo areaC In a cofferdamD In the wheelhouse |  |
| 232 02.0-08 | Flushing of the cargo tanks | C |
|  | Why is the gas concentration periodically measured while the cargo tanks are being flushed with nitrogen?A In order to determine whether the shore facility is effectively supplying nitrogenB In order to determine the oxygen content of the nitrogenC In order to monitor the progression of the flushingD In order to determine at what point the mixture of gases should be burned off |  |
| 232 02.0-09 | Deleted (2007) |  |
| 232 02.0-10 | Taking of samples | B |
|  | After loading with UN No. 1077 PROPYLENE, a sample of liquid is taken at 50% of the fill height. Why?A For no reasonB In order to assess the quality of the cargoC In order to measure the temperature of the liquidD In order to determine whether the shore facility has in fact delivered propane |  |

|  **Practice****Examination objective 3: Dangers of explosion** |
| --- |
| *Number* | *Source* | *Correct answer* |
|  |  |  |
| 232 03.0-01 | Definition of explosive limit | A |
|  | The concentration of gases in a mixture composed of flammable gas and air is below the lower explosive limit. What are the properties of this mixture?A It cannot igniteB It can burn, but not explodeC It can explode but not burnD It can burn or explode |  |
| 232 03.0-02 | Definition of explosive limit | C |
|  | The concentration of gases in a mixture composed of flammable gas and air is higher than the upper explosive limit. What are the properties of this mixture?A It cannot burnB It cannot condenseC With the addition of air an explosive mixture can be formedD It can explode |  |
| 232 03.0-03 | Definition of explosive limit | D |
|  | A mixture of gases is composed of 6 volume per cent propane, 4 volume per cent oxygen and 90 volume per cent nitrogen. How explosive is this mixture considered to be?A Unsafe, since the concentration of propane is above the lower explosive limitB Unsafe, since the concentration of propane is higher than the upper explosive limitC Safe, since the concentration of propane is below the lower explosive limitD Safe, since the concentration of oxygen is too weak to ignite the mixture |  |
| 232 03.0-04 | Definition of explosive limit | D |
|  | A cargo tank contains 100 volume per cent nitrogen. What forms in the cargo tank when it is loaded with isobutane?A A flammable mixture which could explodeB An explosive mixture, since the oxygen content is sufficiently highC An explosive mixtureD A mixture that is not explosive |  |
| 232 03.0-05 | Definition of explosive limit | A |
|  | A mixture of gases is composed of 10 volume per cent propylene, 18 volume per cent oxygen and 72 volume per cent nitrogen. How explosive is this mixture considered to be?A Unsafe, since the concentration of propylene is within the explosive range and the concentration of oxygen is sufficiently highB Unsafe, since the concentration of propylene is above the upper explosive limitC Safe, since the concentration of oxygen is less than 21 volume per cent D Safe, since the concentration of propylene is below the lower explosive limit |  |
| 232 03.0-06 | Critical dilution rate | B |
|  | A cargo tank contains a mixture of gases composed of 5 volume per cent propane, 5 volume per cent oxygen and 90 volume per cent nitrogen. Should this cargo tank be flushed with air?A Yes, since the concentration of propane is outside the explosive rangeB No, since the concentration of oxygen will increase and the mixture will become explosive C Yes, since the oxygen content in the cargo tank is less than 10 volume per cent D Yes, since there is sufficient nitrogen in the cargo tank |  |
| 232 03.0-07 | Critical dilution rate | C |
|  | A cargo tank contains a mixture of gases composed of nitrogen, oxygen and n-butane, with 3 volume per cent oxygen and less than 2 volume per cent n-butane. Should this cargo tank be flushed with air?A No, since the concentration of butane is within the explosive rangeB No, since, when diluted with air, the concentration of oxygen will increase and the mixture will become explosiveC Yes, since the concentrations of butane and oxygen are so low that if diluted with air, a non-explosive mixture is formedD Yes, since the concentration of butane is below the lower explosive limit |  |
| 232 03.0-08 | Risk of explosion | B |
|  | Propane gas is under pressure in a closed system. The propane escapes through a small leak to the outside. What will happen to the propane gas?A It will spontaneously combustB It will mix with the air and form an explosive mixtureC Being a heavy gas, a high concentration will remain near the source D It will not mix with the air but will rise unmixed |  |
| 232 03.0-09 | Explosive limit and static electricity | D |
|  | An area contains air with 5 volume per cent propane gas. A spark occurs as a result of a discharge of static electricity. Will the spark cause the propane/air mixture to ignite?A No, since the ignition energy of the spark is definitely too weakB No, since the concentration of propane is too lowC No, since the concentration of propane is too highD Yes, since the concentration of propane is within the explosive range  |  |

|  **Practice****Examination objective 4: Health risks** |
| --- |
| *Number* | *Source* | *Correct answer* |
|  |  |  |
| 232 04.0-01 | Imminent hazards | A |
|  | Which of the following substances is toxic and corrosive and poses an imminent inhalation hazard?A UN No. 1005, AMMONIA, ANHYDROUSB UN No. 1010, 1,2-BUTADIENE, STABILIZEDC UN No. 1969, ISOBUTANED UN No. 1978, PROPANE |  |
| 232 04.0-02 | Delayed effect | B |
|  | Which of the following substances is carcinogenic?A UN No. 1005, AMMONIA, ANHYDROUSB UN No. 1010, 1,3-BUTADIENE, STABILIZEDC UN No. 1962, ETHYLENED UN No. 1969, ISOBUTANE  |  |
| 232 04.0-03 | Anaesthetizing effect | D |
|  | Which of the following gases has an immediate effect via inhalation on the central nervous system and an anaesthetizing effect with prolonged exposure or at a high concentration? A UN No. 1011, BUTANEB UN No. 1969, ISOBUTANEC UN No. 1077, PROPYLENED UN No. 1086, VINYL CHLORIDE, STABILIZED |  |
| 232 04.0-04 | Definition of the maximum workplace concentration  | C |
|  | What is meant by the maximum workplace concentration of a substance? A The maximum acceptable concentration for an unspecified period of exposureB The maximum acceptable concentration to safeguard healthC The maximum permissible concentration of the substance in air at which even an exposure of 8 hours per day and a maximum of 40 hours per week does not have adverse effects on healthD The acceptable average minimum concentration of the substance in air |  |
| 232 04.0-05 | Definition of the maximum workplace concentration | C |
|  | What is meant by the maximum workplace concentration of a substance?A The average maximum acceptable gas concentration over time of the substance in air for 15 minutes and for not more than 8 hours per dayB The average maximum acceptable gas concentration over time of the substance in air for one hour and not more than eight hours per dayC The maximum permissible concentration of the substance in air at which exposure for 8 hours per day and a maximum of 40 hours per week does not have adverse effects on healthD The average maximum acceptable concentration over time of the substance in air for one hour and not more than eight hours per week |  |
| 232 04.0-06 | Exceeding the maximum workplace concentration | B |
|  | A substance has a maximum workplace concentration of 1 ppm. What is the maximum amount of time a person can remain in an area where the concentration of the substance is 150 ppm?A One minuteB The area should not be enteredC One hourD Eight hours  |  |
| 232 04.0-07 | Maximum workplace concentration – odour threshold | A |
|  | A substance has a maximum workplace concentration of 100 ppm and an odour threshold of 200 ppm. If the substance’s odour cannot be detected in an area, what can be concluded with regard to health risks?A It could be hazardous, since the maximum workplace concentration may be exceededB There is no risk, since the concentration is less than the maximum workplace concentrationC There is no risk, since the concentration is higher than 200 ppmD It is hazardous, since the concentration is higher than 200 ppm |  |
| 232 04.0-08 | Deleted (2007) |  |
| 232 04.0-09 | Asphyxiation | C |
|  | Following a leak, a large cloud of propane gas forms above deck. Irrespective of the combustion hazard, is it dangerous to go above deck without a self-contained breathing apparatus?A No, since propane is not a toxic gasB No, since propane is not harmful to the lungsC Yes, since propane displaces air and can also have an asphyxiating effectD Yes, since propane is a toxic gas |  |

|  **Practice****Examination objective 5.1: Measuring gas concentrationMeasuring devices** |
| --- |
| *Number* | *Source* | *Correct answer* |
|  |  |  |
| 232 05.1-01 | Measuring gas concentration | D |
|  | Which device may be used to measure hydrocarbons in nitrogen?A A flammable gas detectorB An oxygen meterC A combined flammable gas detector/oxygen meterD An infrared detector |  |
| 232 05.1-02 | Measuring gas concentration | A |
|  | Which device should be used to measure small concentrations of toxic gases in nitrogen?A A toximeterB A flammable gas detectorC An oxygen meterD An infrared detector |  |
| 232 05.1-03 | Measuring gas concentration | B |
|  | Which device should be used to measure small concentrations of toxic gases in air?A An infrared detectorB A toximeterC A flammable gas detectorD A combined flammable gas detector/oxygen meter  |  |
| 232 05.1-04 | Measuring gas concentration | C |
|  | Which device is used to determine the oxygen content in a mixture of gases?A A toximeterB A flammable gas detectorC An oxygen meterD An infrared detector |  |
| 232 05.1-05 | Measuring gas concentration | D |
|  | How is it determined whether a mixture of gases contains nitrogen?A With an infrared detectorB With a flammable gas detectorC With a toximeterD With none of the measuring devices mentioned above  |  |
| 232 05.1-06 | Measuring gas concentration | A |
|  | With which device is it possible to establish beyond any doubt that a mixture of hydrocarbons and air is not explosive?A With a combined flammable gas detector/oxygen meter B With a flammable gas detectorC With a toximeterD With an infrared detector |  |
| 232 05.1-07 | Measuring gas concentration | B |
|  | Which equipment should be used to determine the concentration of a flammable gas in air?A An oxygen meterB A flammable gas detectorC An ultrasonic measuring deviceD A toximeter |  |
| 232 05.1-08 | Measuring gas concentration | C |
|  | Which device should be used to measure the concentration of a gas known to be non-flammable but toxic?A A flammable gas detectorB A combined flammable gas detector/oxygen meter C A toximeterD An ultrasonic measuring device |  |
| 232 05.1-09 | Measuring gas concentration | A |
|  | An area filled with inert gas probably still contains residues of propane gas. With which device cannot the propane content in any way be established?A With an oxygen meterB With an infrared detectorC With a combined flammable gas detector/oxygen meter D With a flammable gas detector |  |
| 232 05.1-10 | Measuring gas concentration | D |
|  | The concentration of gas in an area may only be measured with a toximeter before entering the area. For which of the following gases is the toximeter sufficiently appropriate?A For UN No. 1010, 1,2-BUTADIENE, STABILIZEDB For UN No. 1086, VINYL CHLORIDEC For UN No. 1280, PROPYLENE OXIDED For none of these substances |  |

|  **Practice****Examination objective 5.2: Measuring gas concentration Use of measuring devices** |  |
| --- | --- |
| *Number* | *Source* | *Correct answer* |
|  |  |  |
| 232 05.2-01 | Measuring gas concentration  | A |
|  | To measure the concentration of a toxic substance in an area, a test tube suitable for the purpose is used. After correctly making the measurements, no discoloration of the test tube is observed. Which of the following statements is true?A The test tube should not be used for any other measurementsB The test tube may immediately be reused for a second measurement in another areaC The test tube may eventually be reused provided it is kept in a refrigeratorD The test tube may eventually be reused provided it is closed with its original rubber stopper |  |
| 232 05.2-02 | Measuring gas concentration | D |
|  | May a suitable test tube be used to measure the concentration of a toxic substance in an area if its use-by date has expired?A YesB Yes, but only to obtain a preliminary result for the substanceC Yes, but only provided the correction factor contained in the instructions for use is applied D No |  |
| 232 05.2-03 | Measuring gas concentration | A |
|  | A test tube is used to measure low concentrations of gas. The test tube is graduated. After a set number of pumpings, the length of the coloured traces is noted. The test tube used is graduated from 10 to 100 ppm; the number of pumpings is n=10. After five pumpings the discolouration indicates exactly 100 ppm. What can be concluded from this? A The result is invalid and a test tube with a different range of concentrations should be usedB The concentration of gas is less than 100 ppmC The concentration of gas is above 1,000 ppmD The test tube is saturated, but the concentration is correctly indicated |  |
| 232 05.2-04 | Measuring gas concentration  | D |
|  | A test tube is used to measure low concentrations of gas. The test tube is graduated. After a set number of pumpings the length of the coloured traces is noted. The test tube used is graduated from 10 to 100 ppm; the number of pumpings is n=10. After 10 pumpings, there is no discolouration. What can be concluded from this?A The result is invalid and a test tube with a different range of concentrations should be usedB The instructions for use relating to application of a special correction factor should be consultedC The concentration of gas is higher than 10 ppmD The concentration of gas is less than 10 ppm |  |
| 232 05.2-05 | Measuring gas concentration  | A |
|  | How can it be established that the bellows pump is airtight?A By inserting a closed test tube into the nozzle-tip after compressing the bellowsB By inserting an open test tube into the nozzle-tip after compressing the bellowsC By inserting a used test tube into the nozzle-tip and pumping 10 times D By inserting an upside-down test tube into the nozzle-tip and compressing the bellows |  |
| 232 05.2-06 | Measuring gas concentration  | D |
|  | A combined flammable gas detector/oxygen meter gives the following results: oxygen 18%, “explosion” 50%. What do these results mean?A The “explosion” reading cannot be relied upon since the oxygen content is too low for combustionB The concentration of flammable gases is 50 volume per cent, i.e. above the lower explosive limitC The concentration of flammable gases is 50% of the lower explosive limit, but since the oxygen content is too low, the results are not clearD The concentration of flammable gases is 50% of the lower explosive limit of the test gas. For a measurement made with a combined device, there is sufficient oxygen. The mixture is therefore not explosive, since the lower explosive limit has not been reached |  |
| 232 05.2-07 | Measuring gas concentration  | A |
|  | A combined flammable gas detector/oxygen meter gives the following results: oxygen 8%, “explosion” 10%. What do these results mean?A The “explosion” reading cannot be relied upon since the oxygen content is too low for combustionB Since there is insufficient oxygen for combustion, the gas concentration reading of 10% is above the lower explosive limitC The concentration of flammable gases is 10 volume per cent, therefore the mixture is not explosiveD The measuring device is defective |  |
| 232 05.2-08 | Measuring gas concentration  | A |
|  | A prior reading of oxygen content shows a sufficient concentration. The gas detector shows a reading of 50%. What does this mean?A The concentration of flammable gases is 50% of the lower explosive limit of the test gasB The concentration of flammable gases is 50% of the upper explosive limitC The concentration of flammable gases is 50 volume per centD The concentration of oxygen is 50% |  |
| 232 05.2-09 | Measuring gas concentration  | B |
|  | A flammable gas detector operates in accordance with the principle of catalytic combustion. For which of the following substances should the device not be used in order not to damage the measuring apparatus?A UN No. 1005, AMMONIA, ANHYDROUSB UN No. 1063, METHYL CHLORIDEC UN No. 1077, PROPYLENED UN No. 1280, PROPYLENE OXIDE |  |
| 232 05.2-10 | Deleted (2007) |  |

|  **Practice****Examination objective 6: Monitoring of closed spaces and entry to these spaces** |
| --- |
| *Number* | *Source* | *Correct answer* |
|  |  |  |
| 232 06.0-01 | Measuring gas concentration  | B |
|  | Before entering a hold space gas concentrations must be measured. How are the measurements taken?A A person enters the hold space and takes measurements at all possible locationsB Measurements are taken with a flexible tube from top to bottom at various heightsC A measurement is taken with a flexible tube just below the hatchD A measurement is taken with a flexible tube at half the height of the hold space |  |
| 232 06.0-02 | Measuring gas concentration, 7.2.3.1.6  | A |
|  | A vessel is loaded with UN No. 1978, PROPANE. After careful measurement it is ascertained that a hold space contains enough oxygen and less than 5% of the lower explosive limit of propane. Which of the following statements is correct?A The hold space may be entered by a person without protection provided that the national accepted exposure levels are not exceededB The hold space may be entered only if the person in question is wearing a protective suitC The hold space may be entered by a person without protection only if a gas free certificate has been issuedD The hold space may not be entered |  |
| 232 06.0-03 | Deleted (2007) |  |
| 232 06.0-04 | Measuring gas concentration | C |
|  | A combined flammable gas detector/oxygen meter produces the following reading after measuring the atmosphere in an enclosed space: 16% oxygen by volume and 9% of the lower explosive limit. Which of the following statements is correct? |  |
|  | A The space is not safe for people and there is a risk of explosionB The space is safe for people but there is a risk of explosionC The space presents no risk of explosion but it is not safe for peopleD The space presents no risk of explosion and it is also safe for people |  |
| 232 06.0-05 | Measuring gas concentration | A |
|  | A combined flammable gas detector/oxygen meter produces the following reading after measuring the atmosphere in an enclosed space: 16% oxygen by volume and 60% of the lower explosive limit. Which of the following statements is correct with respect to entry into this space?A The space is not safe for people and the explosion risk threshold has been exceededB The space is safe for people but there is a risk of explosionC In this space, the explosion risk threshold has not been exceeded but it is not safe for peopleD The space presents no risk of explosion and it is also safe for people |  |
| 232 06.0-06 | 7.2.3.1.6 | D |
|  | A vessel is carrying UN No. 1010, BUTADIENE-1-3, STABILIZED. After measurement of the atmosphere in a hold space, it is ascertained that it contains 20% oxygen by volume and 100 ppm butadiene. A person who enters the hold space must wear a protective suit and a self-contained breathing apparatus. What additional measures must be taken?A The person in question must be given a portable radiotelephone and a person must be posted by the access hatchB At the access hatch a person who is in direct contact with the master must be posted in the wheelhouseC The person must be secured with a line and a person must be posted at the access hatch to ensure supervision, who can communicate with the master in the wheelhouseD The person must be secured with a line and a person must be posted to supervise entry; that person must have the same safety equipment at the access hatch. It must also be ensured that two other persons are within calling distance of that person |  |
| 232 06.0-07 | Measuring gas concentration  | D |
|  | A vessel is carrying UN No. 1010, BUTADIENE-1-3, STABILIZED. A hold space is inspected, with the following result: the oxygen meter reads 21% volume, the flammable gas detector indicates 10% of the lower explosive limit and the toximeter reads 10 ppm of butadiene. What do these measurements mean?A The space is safe for people and presents no risk of explosionB The space is safe for people |  |
|  | C The space presents no risk of explosion |  |
|  | D The measurements do not make sense |  |
| 232 06.0-08 | 7.2.3.1.6 | C |
|  | A vessel is carrying UN No. 1033, DIMETHYL ETHER. Measurement of the atmosphere in a hold space shows that it contains 20% oxygen by volume and 500 ppm of dimethyl ether. A person must enter this hold space. The person is equipped with a protective suit, a self-contained breathing apparatus and emergency equipment with a safety cord. There is already a person supervising near the access hatch. What additional measures must be taken?A The person entering the hold space and the one on deck must be given portable radiotelephones so that they can communicate with two other people on deckB It must be ensured that there are two people within calling distance of the person near the access hatchC The same safety equipment must be made available to the person at the access hatch and it must be ensured that there are two people within calling distance of that personD None |  |
| 232 06.0-09 | Measuring gas concentration  | C |
|  | What must be done before being able to enter a hold space?A Put on a self-contained breathing apparatusB It is enough to measure the concentration of gas in the hold spaceC Measure the oxygen and gas concentrations in the hold spaceD It is enough to measure the concentration of oxygen in the hold space |  |
| 232 06.0-10 | Deleted (28.09.2016)  |  |

|  **Practice****Examination objective 7: Certificates for degassing and permitted work** |
| --- |
| *Number* | *Source* | *Correct answer* |
|  |  |  |
| 232 07.0-01 | Measuring gas concentration  | B |
|  | Your own measurements have shown that a hold space is free of gas and the oxygen concentration is sufficient. A gas free certificate is not available. What activities may be carried out in this hold space?A Only visual checks may be carried outB Visual checks may be carried out, and light maintenance work not requiring a flame and not producing sparks may be doneC The hold space may be cleaned and hammered to remove the rustD A hole in a wall may be welded closed |  |
| 232 07.0-02 | Measuring gas concentration | B |
|  | Your own measurements have shown that a hold space is free of gas and the oxygen concentration is sufficient. A gas free certificate is not available. What activities may be carried out in this hold space by unprotected persons?A Only visual checks may be carried outB The hold space may be cleanedC The hold space may be cleaned and hammered to remove the rustD A hole in a wall may be welded closed |  |
| 232 07.0-03 | 8.3.5 | C |
|  | A vessel is loaded with UN No. 1978, PROPANE. A reinforcing support has to be welded onto the radar mast outside the cargo area. Is this permitted?A Yes, as this is a minor task carried out away from the cargo areaB Yes, provided during the welding the gas concentration is regularly measured on siteC No, unless this is done with the agreement of the competent authority D No, it is only allowed at a shipyard |  |
| 232 07.0-04 | 8.3.5 | A |
|  | A vessel is loaded with UN No. 1011, BUTANE. During navigation some minor repairs that are likely to produce sparks are to be carried out in the engine room. Is this allowed?A Yes, provided that the fuel tank is not welded and the doors and other openings are closedB Yes, it is allowed to weld anywhereC No, a gas free certificate is requiredD No, it is only allowed at a shipyard |  |
| 232 07.0-05 | 8.3.5 | D |
|  | Cargo tanks are flushed with nitrogen and the gases are evacuated (last cargo: UN No. 1978, PROPANE). During the flushing some minor repairs that are likely to produce sparks are to be carried out in the engine room. Is this allowed?A Yes, provided that authorization has been obtained from the person responsible for trans-shipment at the shore installationB Yes, provided that the doors and other openings are closedC No, authorization from a classification society is requiredD No, it is not allowed during loading, unloading and degassing |  |
| 232 07.0-06 | 8.3.5 | A |
|  | A tank vessel is loaded with UN No. 1978, PROPANE. A new fire extinguisher pipe is to be welded on the deck. Is this allowed?A NoB No, for this a gas free certificate is requiredC Yes, as the welding is not carried out on the piping containing the productD Yes, provided the gas concentrations are regularly measured |  |
| 232 07.0-07 | 7.2.3.1.6 | A |
|  | A tank vessel is loaded with UN No. 1969, ISOBUTANE. Is a person allowed to enter the hold space without any protective equipment to carry out a check?A Yes, this is allowed during loading once it is ascertained that the provisions of 7.2.3.1.6 have been followedB No, only with the agreement of the competent authorityC No, only with the agreement of the person responsible for trans-shipment at the shore installationD No, only with a gas free certificate |  |
| 232 07.0-08 | 8.3.5 | A |
|  | A tank vessel is moored at a shore installation and is in an onshore assigned anti-explosion protection zone. Some minor repairs liable to produce sparks have to be carried out in the accommodation. Is this allowed?A No, only with the agreement of the competent authorityB Yes, provided the accommodation doors and other openings are closedC Yes, provided during the work the gas concentration is regularly measured on siteD Yes, provided you have the agreement of the shore facility |  |
| 232 07.0-09 | 8.3.5 | C |
|  | A tank vessel is loaded with UN No. 1011, BUTANE. Some minor repairs likely to produce sparks have to be carried out in the engine room during the journey. Is this allowed?A Yes, as it is minor work outside the cargo area. Such work can be carried out without any other measuresB Yes, provided during the work the gas concentration is regularly measured on siteC Yes, provided the engine room doors and other openings are closedD No, it is not allowed without the agreement of the competent authority |  |
| 232 07.0-10 | 8.3.5 | D |
|  | A tank vessel is being loaded with UN No. 1280, PROPYLENE OXIDE. Some minor welding work has to be carried out in the accommodation. Is this allowed?A Yes, as it is minor work outside of the cargo areaB Yes, provided during the welding work the gas concentration is regularly measured on siteC Yes, with the agreement of the shore installationD No |  |

|  **Practice****Examination objective 8: Degree of filling and over-filling** |
| --- |
| *Number* | *Source* | *Correct answer* |
|  |  |  |
| 232 08.0-01 | 1.2.1 | C |
|  | To what temperature is the maximum permissible degree of filling of cargo tanks set out in ADN applicable?A 15 °CB 20 °CC The temperature during loadingD The highest temperature likely to be encountered during transport |  |
| 232 08.0-02 | Degree of filling | D |
|  | Propane from shore tank A must be loaded into cargo tanks 1, 3 and 6 and propane from shore tank B must be loaded into cargo tanks 2, 4 and 5. The temperatures in the cargo tanks are not the same. What is the maximum degree of filling that must be observed?A A single degree of filling for all the cargo tanks, corresponding to the average temperature of the propaneB A single degree of filling for all the cargo tanks, corresponding to the lowest temperature of the propaneC A single degree of filling for all the cargo tanks, corresponding to the highest temperature of the propaneD 91% for each cargo tank |  |
| 232 08.0-03 | Degree of filling | C |
|  | Why should a certain degree of filling of a cargo tank not be exceeded?A Because the vessel would be overloadedB To avoid “waves” in the cargo tanks and thus avoid damaging the tanksC To prevent the safety valve from opening if it heats upD To ensure the stability of the vessel |  |
| 232 08.0-04 | Degree of filling | A |
|  | UN No. 1978, PROPANE is loaded at a temperature over 15 °C. Up to what filling level is it possible to load?A 91%B More than 91%C Less than 91%D 95% |  |
| 232 08.0-05 | Degree of filling | B |
|  | What correction has to be applied to determine the permissible degree of filling?A Content correctionB Trim correctionC Pressure correctionD Vapour pressure correction |  |
| 232 08.0-06 | Degree of filling | A |
|  | What correction sometimes has to be applied to determine the permissible degree of filling?A Density correctionB Content correctionC Pressure correctionD Vapour pressure correction |  |
| 232 08.0-07 | Overfilling | C |
|  | What risk is there in the event of overfilling?A That the vessel’s load is not balancedB That the vessel is overloadedC That the cargo may leakD That there may be a backflow into the cargo tank |  |
| 232 08.0-08 | 9.3.1.21.1 | D |
|  | According to ADN, what degree of filling should actuate the automatic high-level sensor against overfilling?A 86% maximumB 91% maximumC 95% maximumD 97.5% maximum |  |
| 232 08.0-09 | 9.3.1.21.1 | A |
|  | According to ADN, what degree of filling should actuate the level alarm device?A 86%B 91%C 95%D 97.5% |  |
| 232 08.0-10 | Degree of filling | B |
|  | What should be done when the level device is activated?A Immediately stop the loadingB If necessary, reduce the flow of loadingC Activate the quick closing valveD Transfer some of the product into another cargo tank |  |
| 232 08.0-11 | 7.2.4.16.16 | B |
|  | Why must the holding time be calculated during the transport of refrigerated liquefied gas without temperature control?A To check whether the maximum filling level of the cargo tank has been exceededB To check whether the intended journey can be made safely and without the release of material C To check which substance can be transportedD To check whether the safety valve pressure is set sufficiently high |  |
| 232 08.0-12 | 7.2.4.16.17 | A |
|  | What parameters must be taken into account when calculating the holding time during the transport of refrigerated liquefied gas?A The heat transfer value, the activation pressure of the safety valves, the temperature of the cargo, the degree of filling of the cargo tanks and the ambient temperatureB The activation pressure of the safety valves, the temperature of the cargo, the degree of filling of the cargo tanks and the temperature of the cargo tanksC The heat transfer value, the activation pressure for the safety valves, the temperature of the cargo and the degree of filling of the cargo tanksD The heat transfer value, the activation pressure of the safety valves, the degree of filling of the cargo tanks, the ambient temperature and the temperature of the cargo tanks |  |
| 232 08.0-13 | 7.2.4.16.17 | C |
|  | The expected duration of the journey of a vessel is 14 days. What is the holding time during the transport of refrigerated liquefied gas?A 12 daysB 28 daysC 38 daysD 42 days |  |

|  **Practice****Examination objective 9: Safety installations** |
| --- |
| *Number* | *Source* | *Correct answer* |
|  |  |  |
| 232 09.0-01 | Safety against bursts in the piping  | A |
|  | What is the function of a safety device against bursts in the piping?A Prevent leaks of large quantities of product in the event of a burst in the pipingB Limit the load flowC Prevent depression in the cargo tanksD Prevent excessive pressure build-up in the cargo tanks |  |
| 232 09.0-02 | Safety against bursts in the piping | C |
|  | Where are safety devices against bursts in the piping placed?A In the piping under pressure, near the pumpB In the suction pipes, near the pumpC In the cargo tank, in the pipes for loading and unloading D On the deck, in the loading and unloading piping |  |
| 232 09.0-03 | Safety against bursts in the piping | D |
|  | What is a device against bursts in the piping?A A remote-controlled valve that can be closed if neededB A valve with a hand-operated control that can be closed in an emergencyC A narrow section in the line to limit the flowD A self-closing stop-valve requiring no command |  |
| 232 09.0-04 | Safety against bursts in the piping | B |
|  | When must a device against bursts in the piping be activated?A When the flow speed is lower than the calculated speedB When the flow speed is greater than the calculated speedC When a rapid blocking valve has been installed before the device against bursts in the pipingD When a narrow section has been installed before the device against bursts in the piping |  |
| 232 09.0-05 | Safety against bursts in the piping | A |
|  | The device against bursts in the piping is a spring valve set into the piping. When must the valve close on its own?A When the flow speed is so high that the depression over the valve exceeds the tensile force of the springB When the flow speed is so high that the depression over the valve is less than the tensile force of the springC When the flow speed is so high that the depression before the valve exceeds the depression corresponding to the tensile force of the springD When the flow speed is so high that the over pressurization behind the valve exceeds the depression corresponding to the tensile force of the spring |  |
| 232 09.0-06 | 9.3.1.21.9 | A |
|  | During loading and unloading the quick closing valves must be able to be closed by a switch so that, in an emergency, the loading or unloading can be stopped. Where must these switches be located?A At two locations on the vessel (fore and aft) and at two locations on shoreB At the shore installation and at the shore connection of the pipes for loading and unloadingC In the wheelhouse, at the shore connection of the pipes for loading and unloading and at the shore installationD At two locations on shore (directly at the access to the vessel and at a sufficient distance) and in the wheelhouse |  |
| 232 09.0-07 | 7.2.2.21 | B |
|  | What is the function of the quick closing valve?A Automatic closure of valves in the connecting pipes between the shore installation and the vessel during gas releaseB Possibility of closing the quick closing valve located in the connecting pipe between the shore installation and the vesselC Automatic stopping of the unloading pumps if there is a gas releaseD Possibility of quickly shutting off unloading pumps if there is a gas release |  |
| 232 09.0-08 | 7.2.2.21 | C |
|  | A vessel is connected by a loading facility with liquid and gas lines of a shore facility. A switch for the rapid closing devices is activated, thus stopping the loading. What happens after that?A Only the unloading pumps and the compressors on board the vessel are shut offB Only the shore facility’s rapid blocking valve is closedC The quick closing valves are closed and the unloading pumps and compressors on board the vessel are shut offD The quick closing valves are closed and the loading installation is uncoupled from the breakage link  |  |
| 232 09.0-09 | Rapid closing system | C |
|  | Which of the following equipment is part of the rapid closing system?A Level gaugeB Level warningC Quick closing valves in the loading installationD Breakage link in the loading installation |  |
| 232 09.0-10 | Rapid closing system | B |
|  | In which case will the rapid closing safety system linked to the shore facility be activated?A When the level gauge is activatedB When the safety system against overflowing is activatedC When loading is carried out too quicklyD When the cargo reaches too high a temperature |  |
| 232 09.0-11 | 9.3.1.21.11 | D |
|  | If during the transport of refrigerated liquefied gas there is a leak in the connection to a shore installation, the water-spray system must be activated as a safety measure. Why?A To cool the refrigerated liquefied gas on the deckB To protect the wheelhouse and the accommodation from the cargoC To avoid an explosion on the deckD To protect the deck against brittle fracture given that the refrigerated liquefied gas evaporates quickly as a result of heating  |  |
| 232 09.0-12 | Treatment of the cargo, 9.3.1.24.1 (a) | B |
|  | In what conditions may a LNG cargo remain indefinitely on board a type G vessel?A When the cargo tank or tanks is/are filled only to 86%B When a refrigeration system is availableC When the crew constantly records the temperatureD When critical pressure safety equipment is stopped |  |

|  **Practice****Examination objective 10: Pumps and compressors** |
| --- |
| *Number* | *Source* | *Correct answer* |
|  |  |  |
| 232 10.0-01 | Unloading of the cargo | C |
|  | In which of the following cases is the residual cargo smallest?A During unloading with an evaporator installed on shoreB During unloading with compressors installed on shoreC During unloading, with pressurized nitrogen from shoreD During unloading with submerged pumps of the vessel |  |
| 232 10.0-02 | Unloading of the cargo | D |
|  | A vessel is equipped with two compressors and two deck pumps. Can propane be unloaded using the compressors only?A NoB No, at least one pump is requiredC Yes, alwaysD Yes, if the back pressure is not too great |  |
| 232 10.0-03 | Unloading of the cargo | A |
|  | A vessel is equipped with two compressors and two deck pumps. Can propane be unloaded using only deck pumps?A NoB Yes, alwaysC Yes, but it will take longerD Yes, if the gas return flow in the shore tank is ensured |  |
| 232 10.0-04 | Deck pumps | B |
|  | What safety mechanism is there on the deck pumps?A A minimum filling level switchB A motor temperature safety deviceC A low pressure switchD A breakage plate |  |
| 232 10.0-05 | Compressors | C |
|  | What can cause major damage to a compressor?A A closed inlet connectionB A too low operating speedC Liquid intakeD Lack of a pressure difference between the intake and outflow sides |  |
| 232 10.0-06 | Compressors | D |
|  | Why is a low pressure switch often installed on the intake side of a compressor?A To protect the compressorB To avoid intake of liquidC To avoid too low a temperatureD To avoid a depression in the cargo tanks |  |
| 232 10.0-07 | Deck pumps | A |
|  | Why is a compressor required for the use of a deck pump?A To provide the deck pump with liquidB To empty the loading installationC To create a pressure difference in the pumpD To transfer cargo into another cargo tank |  |
| 232 10.0-08 | Compressors | C |
|  | What is the purpose of a separator on the intake side of a compressor?A To lubricate the compressorB To collect liquid so that it is not lostC To avoid damaging the compressor with liquid intakeD To make it possible to eliminate the liquid gathered in the container using a flexible tube |  |
| 232 10.0-09 | Compressors | B |
|  | Why is there an established maximum pressure difference between the intake and outflow sides of compressors?A To avoid too great a pressure difference in cargo tanksB To avoid overloading the compressor motorC To avoid a depression in the cargo tanksD To avoid the opening of the quick closing valves |  |

|  **Emergency measures****Examination objective 1.1: Personal injury – Liquefied gas on skin** |
| --- |
| *Number* | *Source* | *Correct answer* |
| 233 01.1-01 | Liquefied gas on skin | B |
|  | A crew member has had liquefied butane spilled on the hands. What first aid should be administered?A Briefly rinse the handsB Rinse the hands with water for at least 15 minutesC Treat the hands with an anti-burn ointmentD Wrap the hands so that they are kept warm |  |
| 233 01.1-02 | Liquefied gas on skin | A |
|  | A crew member has had liquefied butane spilled on the hands. The victim’s hands have been rinsed with water for at least 15 minutes. If after the rinsing the hands do not recover their natural colour, what else has to be done?A Call a doctorB Call the victim’s family so that they can retrieve the victimC Put the victim to bed to keep the person warmD Treat the hands with an anti-burn ointment and wrap them |  |
| 233 01.1-03 | Liquefied gas on skin | C |
|  | What has to be done if a crew member has had liquefied butane spilled on his or her body?A Immediately remove the clothing and pad the body with water and sterile cottonB Immediately remove the clothing and shower the personC Put the person in a shower, then remove clothing in the showerD Have the person sit, clothed, in a warm bath for at least 15 minutes |  |
| 233 01.1-04 | Liquefied gas on skin | D |
|  | A crew member has had liquefied ammonia spilled on the hands. What is the first thing that has to be done?A Call a doctorB Have the person taken as quickly as possible to a burn centreC Apply an anti-burn cream copiously on the handsD Rinse the person’s hands with water for at least 15 minutes |  |

|  **Emergency measures****Examination objective 1.2: Personal injury – Breathing in gas** |
| --- |
| *Number* | *Source* | *Correct answer* |
|  |  |  |
| 233 01.2-01 | Breathing in gas | C |
|  | A member of the vessel’s crew has breathed in a large quantity of propane but has not lost consciousness. What is the first thing that has to be done?A Have the person breathe freelyB Give the person oxygenC Bring the person away from the danger zone and keep the person under surveillanceD Bring the person away from the danger zone and lie the person down in a stable position |  |
| 233 01.2-02 | Breathing in gas | D |
|  | A member of the vessel’s crew has breathed in propane and has lost consciousness but is still breathing. What is the first thing that has to be done?A Mouth-to-mouth resuscitationB Give the person oxygenC Bring the person away from the danger zone and keep the person under surveillanceD Bring the person away from the danger zone and lie the person down in a stable position |  |
| 233 01.2-03 | Breathing in gas | A |
|  | A member of the vessel’s crew has breathed in propane, has lost consciousness and is not breathing. What is the first thing that has to be done?A Bring the person away from the danger zone and apply mouth-to-mouth resuscitationB Give the person oxygenC Bring the person away from the danger zone and keep the person under surveillanceD Bring the person away from the danger zone and lie the person down in a stable position |  |
| 233 01.2-04 | Breathing in gas | B |
|  | A member of the vessel’s crew has breathed in ammonia. The person is coughing and has trouble breathing. What is the first thing that has to be done?A Give the person oxygen until there is no more coughing, then have the person lie down on a bedB Bring the person away from the danger zone, keep the person under surveillance and call a doctorC Shower the person and remove clothingD Apply mouth-to-mouth resuscitation and inform a doctor |  |
| 233 01.2-05 | Breathing in gas | B |
|  | A member of the vessel’s crew has breathed in some propane gas. When should mouth-to-mouth resuscitation be applied?A If the victim has lost consciousness and is breathingB If the victim has lost consciousness and is not breathingC If the victim has not lost consciousness and is breathingD If the victim has not lost consciousness and is not breathing |  |

|  **Emergency measures****Examination objective 1.3: Personal injury – Emergency assistance, general** |
| --- |
| *Number* | *Source* | *Correct answer* |
| 233 01.3-01 | Emergency assistance, general | A |
|  | During an inspection, a member of the vessel’s crew feels sick in a hold space. What is the first thing that has to be done?A Inform the master and provide first aidB Enter the hold space and find out what happened to the victimC Immediately remove the victim from the hold space with the help of a colleagueD Activate the “do not approach” signal |  |
| 233 01.3-02 | Emergency assistance, general | C |
|  | A member of the vessel’s crew trips on piping and has a serious fall. What is the first thing that has to be done?A Apply mouth-to-mouth resuscitationB Put the victim to bedC Check if the victim has lost consciousnessD Inform a doctor |  |
| 233 01.3-03 | Emergency assistance, general | C |
|  | How can it be determined that a victim has lost consciousness as a result of an accident?A Check whether the victim’s pulse can be feltB Check whether the thorax is moving and the victim is breathingC Check whether the victim reacts to words or other stimuliD Check whether the victim reacts to the smell of ether |  |
| 233 01.3-04 | Emergency assistance, general | D |
|  | A member of the vessel’s crew has breathed in a dangerous gas and has to be transported to hospital. What must absolutely be given to the crew member to take with him or her? A The victim’s service recordB The telephone number of the victim’s familyC The victim’s passportD Information on the cargo |  |

|  **Emergency measures****Examination objective 2.1: Irregularities relating to the cargo – Leak in a connection** |
| --- |
| *Number* | *Source* | *Correct answer* |
| 233 02.1-01 | Leak in a connection | A |
|  | During unloading, liquid drips from a connection between the pipes for loading and unloading and the loading facility. What is the first thing that has to be done?A Stop the pumps and close the corresponding blocking valvesB Place a receptacle under the connection to collect the leakC Pump slowlyD Place a wet towel around the connection and continue the unloading |  |
| 233 02.1-02 | Leak in a connection | B |
|  | During loading, a connection between the pipes for loading and unloading and the loading facility develops a leak. What is the first thing that has to be done?A Load more slowlyB Stop the loading after consultation with the loading facilityC Continue to loadD Place a receptacle under the connection |  |
| 233 02.1-03 | Leak in a connection | C |
|  | During navigation with a loaded vessel, a place is found in the loading and unloading piping that is not leak-proof. All shut-off valves are closed. What should be done?A Activate the “do not approach” signal, moor the vessel and alert the authoritiesB Activate the “do not approach” signal and continue the voyageC Depressurize the pipingD Continue the voyage without taking any additional measures |  |

|  **Emergency measures****Examination objective 2.2: Irregularities relating to the cargo – Fire in the engine room** |
| --- |
| *Number* | *Source* | *Correct answer* |
| 233 02.2-01 | Fire in the engine room | C |
|  | During loading, a fire breaks out in the engine room. What should be done, apart from extinguishing the fire?A Continue to load, but inform the shore facilityB Just inform the shore facilityC Activate the rapid blocking system and inform the shore facilityD Call the shipping police |  |
| 233 02.2-02 | Fire in the engine room | A |
|  | A motor tank vessel has a cargo of UN No. 1011, BUTANE. A fire breaks out in the machine room while the vessel is under way. What should be done, apart from extinguishing the fire?A Inform the competent authorityB Inform the consigneeC Continue the voyage and activate the “do not approach” signalD Activate the water-spray system |  |
| 233 02.2-03 | Fire in the engine room | C |
|  | During unloading a fire breaks out in the engine room. What should be done, apart from extinguishing the fire?A Simply continue the voyageB Just inform the shore facilityC Activate the rapid blocking system and inform the shore facilityD Activate the “do not approach” signal |  |

| **Emergency measures****Examination objective 2.3: Irregularities relating to the cargo – Hazards in the vicinity of the vessel** |
| --- |
| *Number* | *Source* | *Correct answer* |
| 233 02.3-01 | Hazards that might arise in the vicinity of the vessel | B |
|  | The vessel is moored at a shore facility and is ready to be unloaded. A fire alarm is activated at the shore facility. No fire is visible on the dock and in the vicinity. What must be done?  |  |
|  | A Disconnect the connections and depart with the vesselB Await instructions from the shore facilityC Activate the water-spray systemD Activate the “do not approach” signal |  |
| 233 02.3-02 | Hazards that might arise in the vicinity of the vessel | A |
|  | During unloading a fire breaks out in close proximity on the dock. What must be done?A Activate the rapid blocking system, disconnect the connections and depart with the vesselB Call the shipping policeC Activate the water-spray systemD Await instructions from the shore facility |  |
| 233 02.3-03 | Hazards that might arise in the vicinity of the vessel | B |
|  | While propane is being unloaded, there is a gas leak at the shore facility. The alarm is activated. What must be done? A Activate the water-spray systemB Await instructions from the shore facilityC Continue to unload, but wear a breathing apparatusD Constantly measure the gas concentration on deck |  |
| 233 02.3-04 | Safety requirements, 7.2.4.16.17 | A |
|  | The pressure is rising faster than expected in a cargo tank filled with refrigerated liquefied gas. The pressure in the cargo tank is likely to exceed the activation pressure for the safety valves before the cargo can be unloaded. What must be done?A The master informs the nearest emergency and security servicesB The master contacts the unloading berthC The master reverses courseD The master opens the safety valve |  |

| **Emergency measures****Examination objective 2.4: Irregularities relating to the cargo – Over-filling** |
| --- |
| *Number* | *Source* | *Correct answer* |
| 233 02.4-01 | Over-filling | A |
|  | During loading with propane, the level gauges must be regularly checked. There is a cargo tank that contains more than the amount permitted by the admissible maximum degree of filling. What should be done?A Have the loading stopped by the shore facility and pump the overflow into another cargo tankB Activate the rapid blocking system and pump the overflow into another cargo tankC Ensure that the admissible total quantity is not exceededD During the rest of the loading, allow the overflow to flow into another cargo tank |  |
| 233 02.4-02 | Over-filling | A |
|  | During loading with butane, the level gauges must be regularly checked. A cargo tank contains more than the amount permitted by the admissible maximum degree of filling. What should be done?A Have the loading stopped by the shore facility and pump the overflow into another cargo tankB Separate this cargo tank and another of the cargo tanks, and using the compressor, force liquid into the other cargo tank while continuing to loadC Ensure that the admissible total quantity is not exceededD Do nothing, as in specific circumstances a little more cargo in one cargo tank may be taken |  |
| 233 02.4-03 | Over-filling | D |
|  | During loading with propane, the facility against overflowing is actuated. It is necessary to make a short voyage, in winter. How should this be done?A Disconnect the facility against overflowing and continue to loadB Depart with the vessel, without undertaking any other actionC As more cargo may be carried, there is no problemD Pump back some of the cargo until the admissible maximum degree of filling is reached |  |

 **Emergency measures**

 **Examination objective 2.5: Irregularities relating to the cargo – Polymerization**

| *Number* | *Source* | *Correct answer* |
| --- | --- | --- |
| 233 02.5-01 | Polymerization | C |
|  | During carriage of UN No. 1010, 1,2-BUTADIENE, STABILIZED, the temperature rises in one of the cargo tanks. It may be assumed that the cargo has started polymerizing. What should be done?A Activate the water-spray system to cool the cargoB Fill the hold space with water to cool the cargoC Inform the consignee of the cargoD Release vapour from time to time |  |
| 233 02.5-02 | Polymerization | B |
|  | During carriage of UN No. 1010, 1,3-BUTADIENE, STABILIZED, the temperature rises in one of the cargo tanks. It may be assumed that the cargo has started polymerizing. What should be done?A Add the accompanying inhibitorB Inform the consignee of the cargoC Moor the vessel and inform the competent authorityD Fill the hold space with water to cool the cargo |  |
| 233 02.5-03 | Polymerization | D |
|  | During carriage of UN No. 1010, 1,3-BUTADIENE, STABILIZED, the temperature rises in one of the cargo tanks. It may be assumed that the cargo has started polymerizing. What should be done?A Release vapour from time to time to cool the cargoB Activate the water-spray system to cool the cargoC Pump the product out of the cargo tank in question and mix it with the contents of the other cargo tanksD Inform the consignee of the cargo |  |

1. \* Distributed in German by the Central Commission for the Navigation of the Rhine under the symbol CCNR-ZKR/ADN/WP.15/AC.2/2021/12. [↑](#footnote-ref-2)
2. \*\* In accordance with the programme of work of the Inland Transport Committee for 2020 as outlined in proposed programme budget for 2021 (A/75/6 (part V (Sect. 20) para. 20.51). [↑](#footnote-ref-3)