CHEMISTRY

Unit 2 – Written examination 2

2008 Trial Examination

SOLUTIONS

SECTION A: Multiple-choice questions (1 mark each)

Question 1

Answer: D

Explanation:

Polar molecules arise due to significant distortions in the electron distribution within a bond and / or molecule. Oxygen is more electronegative than sulphur and hence when bonded with hydrogen creates a dipole with a significantly uneven distribution of electrons.

Question 2

Answer: A

Explanation:

Heat energy = (specific heat capacity) x (mass) x (temperature change)
We know the specific heat capacity and temperature, but need to calculate the mass.
$mass = moles \times molar\ mass = 10 \times 18 = 180$ g
Heat energy = $4.2 \times 180 \times (75 - 25) = 37800$ J = 37.8 kJ

Question 3

Answer: A

Explanation:

Gas molecules move in random straight lines. They are also considered to be light and experience negligible intermolecular forces.

Question 4

Answer: D

Explanation:

4.22 – 273 = -268.78 °C which is D.

Question 5

Answer: B

Explanation:

760 mmHg = 101.325 kPa. $\frac{900}{760} \times 101.325 = 119.99 = 120$ kPa

Question 6

Answer: A

Explanation:

$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$. Insert values using appropriate units.

$\frac{100kPa \times 3.5 \times 10^6 L}{200K} = \frac{200kPa \times V_2}{400K}$ $V_2 = 3.50 \times 10^6 kPa$.

Remember that the volume of a gas is proportional to the temperature (in kelvin) but inversely proportional to the pressure. It should be noted that since these two effects cancel, the volume should remain constant and the answer could be obtained / predicted without a calculation.

Question 7

Answer: C

Explanation:

K is always +1 and O is almost always -2. Since Cr is a transition element, this does allow variable oxidation states. However, since K and O are fixed the Cr must have an oxidation state of +6.

Question 8

Answer: D

Explanation:

High pressure would increase the solubility of a gas. Also, low temperature favours increased gas solubility. E.g., Oxygen is more soluble in water at low temperature.

Question 9

Answer: C

Explanation:

Nitrification is the oxidation of nitrogen in nitrogen containing compounds.

Question 10

Answer: B

Explanation:

An oxidising agent (oxidant) causes a species to be oxidised. From assigning of oxidation numbers it can be seen that the oxygen gas facilitates the oxidation of sulphur from S(0) to S^{4+}

