

2. Atoms, molecules and stoichiometry

2.2 The mole and the Avogadro constant

Paper 1

Question Paper

- 1 Which statement is correct?
- A 1.0 g of hydrogen gas contains 3.0×10^{23} atoms.
 - B 4.0 g of helium gas contains 1.2×10^{24} atoms.
 - C 16 g of methane gas contains 3.0×10^{24} atoms.
 - D 44 g of carbon dioxide gas contains 6.0×10^{23} atoms.

- 2 Which statement about the Avogadro constant is correct?
- A It is the mass of one mole of any element.
 - B It is the mass of 6.02×10^{23} atoms of any element.
 - C It is the number of atoms in one mole of neon.
 - D It is the number of atoms in 12 g of any element.

- 3 A sample of solid ammonium chloride decomposes on heating.



A total of 2.4×10^{21} molecules of gas is formed.

How many hydrogen atoms are present in the gaseous products?

- A 1.2×10^{21} B 2.4×10^{21} C 4.8×10^{21} D 9.6×10^{21}
- 4 Diamond is a pure form of carbon. The mass of a diamond can be measured in carats. One carat is 0.200 g of carbon.
- Which expression gives the number of carats that contain 6.02×10^{23} carbon atoms?
- A 0.200×12.0
 - B $\frac{0.200}{12.0}$
 - C $\frac{12.0}{0.200}$
 - D $\frac{0.200}{6.02 \times 10^{23}} \times 12.0$

- 5 In this question it should be assumed that $(\text{NH}_4)_2\text{CO}_3 \cdot \text{H}_2\text{O}(\text{s})$ dissolves in water without causing an increase in volume.

Which mass of $(\text{NH}_4)_2\text{CO}_3 \cdot \text{H}_2\text{O}(\text{s})$ should be added to 800 cm^3 of water to form a $0.100 \text{ mol dm}^{-3}$ solution of NH_4^+ ions?

- A 4.56 g B 7.13 g C 9.12 g D 14.3 g