

GCSE Chemistry A (Gateway Science)
J248/03 C1-C3 and C7 Higher (Higher Tier)

Question Set 21

1 The value of the Avogadro constant is 6.02×10^{23} .

(a) What is meant by the Avogadro constant? [1]

The number of entities in 1 mole

(b) Calculate the number of water molecules in 72 g of water, H_2O .

Give your answer to 3 significant figures.

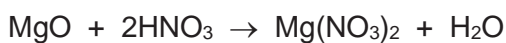
$$72 / 18 = 4 \text{ moles of } H_2O$$

$$4 \times 6.02 \times 10^{23} = \underline{2.408 \times 10^{24}}$$

Answer = 2.41×10^{24} [3]

(c) A student is reacting magnesium oxide with nitric acid.

Look at the equation for the reaction.



The student wants to make 14.8 g of magnesium nitrate, $Mg(NO_3)_2$.

Calculate the masses of magnesium oxide and nitric acid that he needs.

Mass of magnesium oxide needed = 40 g

Mass of nitric acid needed = 12.6 g [4]

Total Marks for Question Set 21: 8

| | MgO | HNO_3 | $Mg(NO_3)_2$ |
|-------|-------|---------|--------------|
| | 40 | 12.6 | 14.8 |
| RFM = | 40 | 63 | 148 |
| | 0.1 | 0.2 | 0.1 |
| | 1 | 2 | 1 |

The Periodic Table of the Elements

| | | | | | | | | | | | | | | | | | | |
|------------------------|-------------------------|------------------------|------------------------|-------------------------|-------------------------|--------------------------|-------------------------|--------------------------|------------------------|--------------------------|-----------------------|------------------------|-------------------------|-------------------------|-------------------------|--------------------------|-----------------------|-----------------------|
| | (1) | (2) | Key | | | | | (3) | (4) | (5) | (6) | (7) | (0) | | | | | |
| | 1 | 2 | atomic number | | Symbol | name | | relative atomic mass | | 18 | | | | | | | | |
| 3 | 1 | 4 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 11 | Li lithium 6.9 | Be beryllium 9.0 | Sc scandium 45.0 | Ti titanium 47.9 | V vanadium 50.9 | Cr chromium 52.0 | Mn manganese 54.9 | Fe iron 55.8 | Co cobalt 58.9 | Ni nickel 58.7 | Cu copper 63.5 | Zn zinc 65.4 | B boron 10.8 | C carbon 12.0 | N nitrogen 14.0 | O oxygen 16.0 | F fluorine 19.0 | He helium 4.0 |
| 19 | 20 | | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 |
| K potassium 39.1 | Ca calcium 40.1 | | Sc scandium 45.0 | Ti titanium 47.9 | V vanadium 50.9 | Cr chromium 52.0 | Mn manganese 54.9 | Fe iron 55.8 | Co cobalt 58.9 | Ni nickel 58.7 | Cu copper 63.5 | Zn zinc 65.4 | Ga gallium 69.7 | Ge germanium 72.6 | As arsenic 74.9 | Se selenium 79.0 | Br bromine 79.9 | Kr krypton 83.8 |
| 37 | 38 | | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 |
| Rb rubidium 85.5 | Sr strontium 87.6 | | Y yttrium 88.9 | Zr zirconium 91.2 | Nb niobium 92.9 | Mo molybdenum 95.9 | Tc technetium | Ru ruthenium 101.1 | Rh rhodium 102.9 | Pd palladium 106.4 | Ag silver 107.9 | Cd cadmium 112.4 | In indium 114.8 | Sn tin 118.7 | Sb antimony 121.8 | Te tellurium 127.6 | I iodine 126.9 | Xe xenon 131.3 |
| 55 | 56 | | 57-71 lanthanoids | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 |
| Cs caesium 132.9 | Ba barium 137.3 | | lanthanoids | Hf hafnium 178.5 | Ta tantalum 180.9 | W tungsten 183.8 | Re rhenium 186.2 | Os osmium 190.2 | Ir iridium 192.2 | Pt platinum 195.1 | Au gold 197.0 | Hg mercury 200.6 | Tl thallium 204.4 | Pb lead 207.2 | Bi bismuth 209.0 | Po polonium | At astatine | Rn radon |
| 87 | 88 | | 89-103 actinoids | 104 | 105 | 106 | 107 | 108 | 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 117 | 118 |
| Fr francium | Ra radium | | actinoids | Rf rutherfordium | Db dubnium | Sg seaborgium | Bh bohrium | Hs hassium | Mt meitnerium | Ds darmstadtium | Rg roentgenium | Cn copernicium | Nh nihonium | Fl flerovium | Lv livermorium | Ts tennessine | Og oganesson | |

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