Essential Pre-Uni Chemistry B4.1

Find the molar masses in amu of the following compounds.

Part A $CaCO_3$

$CaCO_3$, to 4 significant figures.

Part B Na_2CO_3

Na_2CO_3, to 3 significant figures.

Part C $NaOH$

$NaOH$, to 2 significant figures.

Part D HCl

HCl, to 3 significant figures.

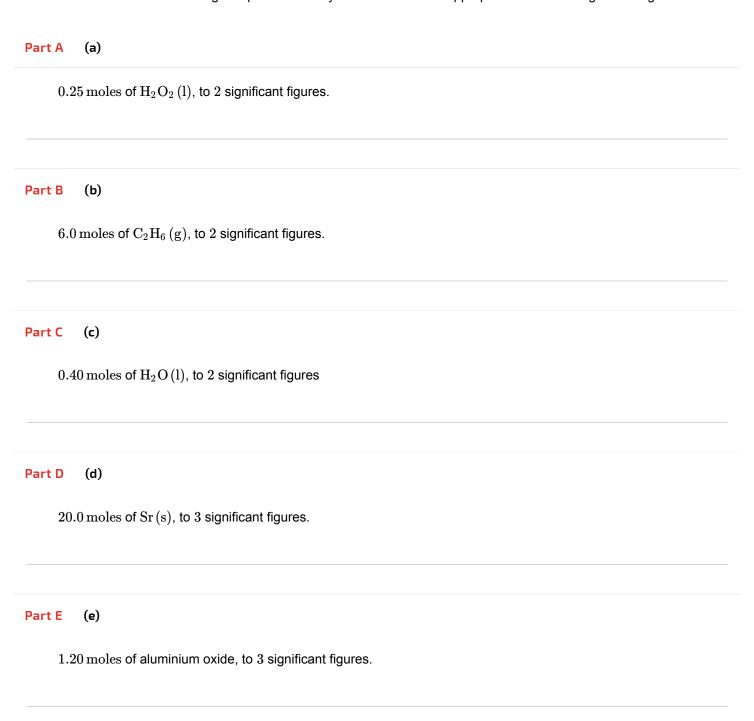
Part E H_2SO_4

H_2SO_4, to 3 significant figures.

Part F $FeSO_4$

$FeSO_4$, to 3 significant figures.

Part G $KMnO_4$

$KMnO_4$, to 3 significant figures.

Part H $Fe_2O_3 \cdot 5\,H_2O$

$Fe_2O_3 \cdot 5\,H_2O$ (the 5 means that the formula includes 5 of what follows, i.e. water, so total mass is for $Fe_2O_3 + 5 \times H_2O$), to 4 significant figures.

Part I   **Calcium hydroxide**

Calcium hydroxide, to 3 significant figures.

Part J   **Butane**

Butane, to 2 significant figures.

Essential Pre-Uni Chemistry B4.2

Calculate the mass of the following compounds. Give your answers to the appropriate number of significant figures.

Part A   **(a)**

0.25 moles of H_2O_2 (l), to 2 significant figures.

Part B   **(b)**

6.0 moles of C_2H_6 (g), to 2 significant figures.

Part C   **(c)**

0.40 moles of H_2O (l), to 2 significant figures

Part D   **(d)**

20.0 moles of Sr (s), to 3 significant figures.

Part E   **(e)**

1.20 moles of aluminium oxide, to 3 significant figures.

7.4 moles of ammonium sulfate, to 2 significant figures.

Essential Pre-Uni Chemistry B5.1

Calculate the concentration in $\mathrm{mol\,dm^{-3}}$ of the following solutions:

Part A   **(a)**

0.40 g NaOH in 100 ml water

Part B   **(b)**

7.3 g HCl in 1000 ml water

Part C   **(c)**

2.5 g H_2SO_4 in 50 ml water

Part D   **(d)**

15 g $FeSO_4$ in 500 ml water, to 2 significant figures

Part E   **(e)**

0.16 g $KMnO_4$ in 200 ml

Essential Pre-Uni Chemistry A2.6

Assume that the mass of an isotope in amu to 3 significant figures is equal to its mass number.

The relative molecular mass of compound M is $135\,\mathrm{amu}$. M contains 3.7% hydrogen, 44.4% carbon and 51.9% nitrogen by mass.

Find the molecular formula of M.

Essential Pre-Uni Chemistry A2.7

Assume that the mass of an isotope in amu to 3 significant figures is equal to its mass number.

Complete combustion of compound N occurs in a stoichiometric ratio of $1 : 6$ with oxygen gas. Complete combustion of $4.2\,\mathrm{g}$ of compound N produces $13.2\,\mathrm{g}$ of carbon dioxide and $5.4\,\mathrm{g}$ of water.

Find the molecular formula of N.

Essential Pre-Uni Chemistry A1.1

Find the empirical formulae for the ten compounds in Parts A - J, from the data given below. No compound contains more than 15 atoms in total in its formula. All compositions are by mass.

Element	Atomic Mass	Element	Atomic Mass
Hydrogen	1.0	Chlorine	35.5
Carbon	12.0	Potassium	39.1
Nitrogen	14.0	Vanadium	50.9
Oxygen	16.0	Chromium	52.0
Sulfur	32.1	Lead	207.2

Part A 35.0% **Nitrogen**, 5.0% **Hydrogen**, 60.0% **Oxygen**

35.0% Nitrogen, 5.0% Hydrogen, 60.0% Oxygen

Part B 90.7% **Lead**, 9.3% **Oxygen**

90.7% Lead, 9.3% Oxygen

Part C 26.6% **Potassium**, 35.3% **Chromium**, 38.1% **Oxygen**

26.6% Potassium, 35.3% Chromium, 38.1% Oxygen

Part D 40.3% **Potassium**, 26.8% **Chromium**, 32.9% **Oxygen**

40.3% Potassium, 26.8% Chromium, 32.9% Oxygen

Part E   29.4% **Vanadium**, 9.2% **Oxygen**, 61.4% **Chlorine**

29.4% Vanadium, 9.2% Oxygen, 61.4% Chlorine

Part F   81.8% **Carbon**, 18.2% **Hydrogen**

81.8% Carbon, 18.2% Hydrogen

Part G   38.7% **Carbon**, 9.7% **Hydrogen**, 51.6% **Oxygen**

38.7% Carbon, 9.7% Hydrogen, 51.6% Oxygen

Part H   77.4% **Carbon**, 7.5% **Hydrogen**, 15.1% **Nitrogen**

77.4% Carbon, 7.5% Hydrogen, 15.1% Nitrogen

Part I   25.9% **Nitrogen**, 74.1% **Oxygen**

25.9% Nitrogen, 74.1% Oxygen

Part J   29.7% **Carbon**, 5.8% **Hydrogen**, 26.5% **Sulfur**, 11.6% **Nitrogen**, 26.4% **Oxygen**

29.7% Carbon, 5.8% Hydrogen, 26.5% Sulfur, 11.6% Nitrogen, 26.4% Oxygen. In your answer, place the elements in the order just given.

Essential Pre-Uni Chemistry A1.2

Complete combustion of $6.4\,\text{g}$ of compound K produced $8.8\,\text{g}$ of carbon dioxide and $7.2\,\text{g}$ of water.

Calculate the empirical formula of K.

Essential Pre-Uni Chemistry A1.3

A Level   A Level
P P P   C C C

Complete combustion of $1.80\,\text{g}$ of compound L produced $2.64\,\text{g}$ of carbon dioxide, $1.08\,\text{g}$ of water and $1.92\,\text{g}$ of sulfur dioxide.

Calculate the empirical formula of L.