

Section A:

1. Match the quantities below to their correct units.

Mass
M_r
Number of moles

no units
mol
g

2. In the box below, write the equation that links number of moles, mass and relative formula mass.

3. Define relative formula mass.

For any calculations, round final answers to 2 decimal places.

4. Calculate the relative formula mass of the following elements and compounds.

- a. Oxygen (O_2)
- b. Ammonia (NH_3)
- c. Methane (CH_4)
- d. Sodium hydroxide ($NaOH$)
- e. Ammonium hydroxide (NH_3OH)
- f. Lithium carbonate (Li_2CO_3)

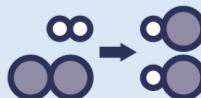
5. Calculate the number of moles in:

- a. 34 g of ammonia

- b. 120 g of sodium hydroxide

- c. 100 g of lithium carbonate

6. Calculate the mass of:





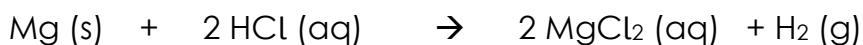
a. 0.25 moles of methane

b. 0.75 moles of ammonium hydroxide

c. 0.1 moles of oxygen

Section B

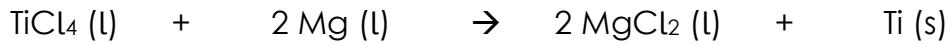
7. Magnesium reacts with hydrochloric acid according to the equation:



a. Explain what is meant by the state symbol (aq).

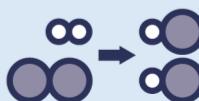
b. Calculate the mass of magnesium chloride that could be made from 50 g of magnesium.

8. Titanium metal can be obtained from a reaction between molten magnesium and titanium chloride. The equation for the reaction is:



a. Explain what is meant by the term molten.

b. Calculate the mass of titanium chloride needed to produce 800 g of titanium.



9. Propane is a fuel that can be burned to release energy. The equation for the reaction is:



- a. Calculate the mass of carbon dioxide that is produced when 250 g of propane is burned.

- b. Explain why the reaction would need to be carried out in a closed vessel to verify the mass of carbon dioxide produced.

Section C

10. Aluminium can be extracted from aluminium oxide by electrolysis. The equation for the process is:



- a. Calculate the relative formula mass of aluminium oxide.
- b. Calculate the mass of aluminium oxide required to produce 1 kg of aluminium.
- c. Explain what has to happen to the aluminium oxide before it can be electrolysed.
- d. Describe what happens at the positive electrode.
- e. Write the half equation for this reaction.
- f. Explain why electrolysis is not used to extract less reactive metals.

