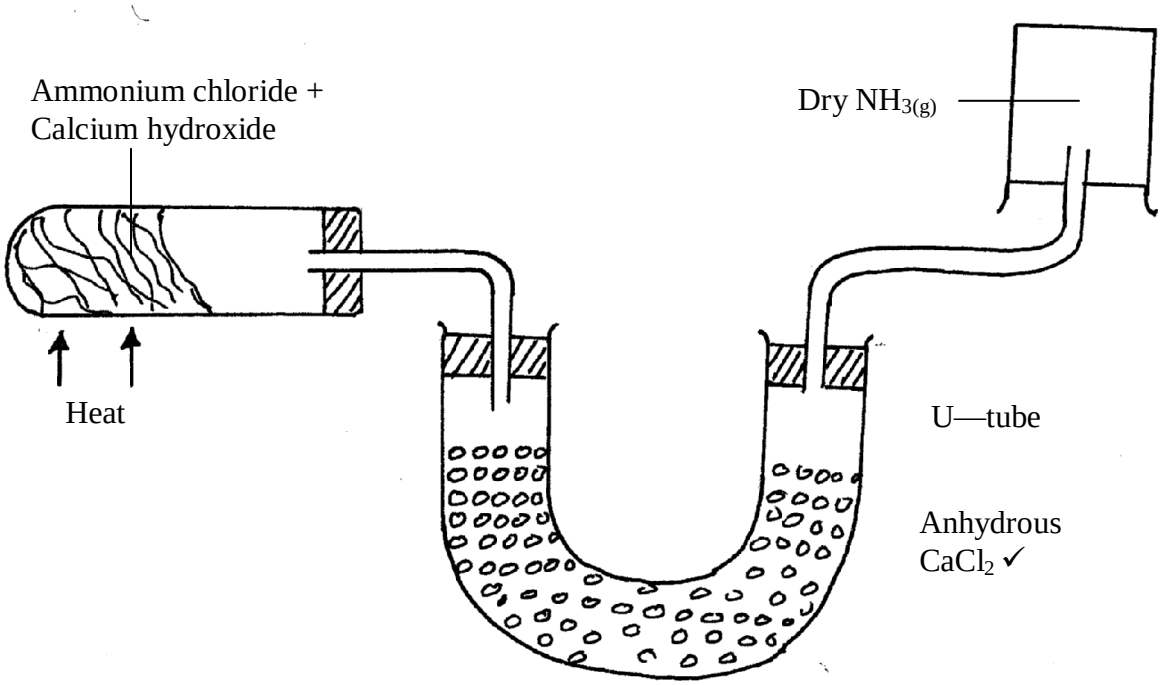
NITROGEN AND ITS COMPOUNDS

MARKING SCHEME

1.



N/B: Allow other alternative correct methods ✓ 1

2. Brown fumes of gas are produced (1mk)

a) Conc. Nitric acid is an oxidising agent therefore Oxidises carbon into ($^1/_2$mk) carbon (IV) oxide and itself reduced to Nitrogen (IV) oxide (brown fumes) ($^1/_2$mk) and water.

b) $4HN_{3(l)} + C_{(s)} \longrightarrow 2H_2O_{(l)} + 4NO_{2(g)} + CO_{2(g)}$ (1mk)

3.(a) (i) Magnesium nitride / Mg_3N_2 (1mk)

(ii) Ammonia / $NH_{3(g)}$ (1mk)

(b) $Mg_3N_{2(s)} + 6H_2O_{(l)} \longrightarrow 3Mg(OH)_2 + 2NH_{3(g)}$ (1mk)

4.let oxidation state of N in $H^+NO_3^-$ be n

$1 + n + 3\times -2 = 0$

$1 + n - 6 = 0$; $n - 5 = 0$ ($\frac{1}{2}$)

$n = +5.$

Oxidation state of N in NO is +2 (½ mk)

Hence nitrogen undergoes reduction in oxidation number and nitric acid (V) acid is reduced while Cu is oxidized.

(1mk)

5 .a) S is ammonium nitrate (1)

R is $Pb(NO_3)_2$ / $Cu(NO_3)_2$ / $Zn(NO_3)_2$ (1)

b) Alkali metals✓

6.a) Concentrated nitric acid is decomposed by light to form nitrogen IV Oxide gas which dissolves in the solution to form a yellow colour(1)

b) The green solution (½) of iron II Chloride changes to a yellow colour (½)
This is because concentrated nitric acid Oxidises iron II chloride to iron III Chloride (1)

7. (a) The first few bubbles of the gas contain air/(is not pure nitrogen) which was in the apparatus ✔ ½

(b) $Ca(OH)_{2(aq)} + CO_{2(g)} \longrightarrow CaCO_{3(s)} + H_2O_{(l)}$ ✔ 1

(c) To absorb carbon (iv) oxide from the air ✔ ½

(d) The brown copper metal changes to black. ✔ 1

8a)	a)Solid v Ammonium Chloride ✓ ½ b) Drying agent ✓ ½ c) $4NH_{3(g)} + 3O_{2(g)} \longrightarrow 2N_{2(g)} + 6H_2O_{(l)}$ d) $4NH_{3(g)} + 5O_2 \longrightarrow 4NO_{(g)} + 6H_2O_{(l)}$

9. a) Colour of copper (II) oxide changes from black to brown✓1

b) (i) Nitrogen / $N_{2\,(g)}$ ✓1

(ii) Water / $H_2O_{(l)}$✓1