Salts

1. a) Conc. H_2SO_4 / H_2SO4
   b) Heat the solution to concentrate it.
   Allow for crystals to form ✓ ½ Filter ✓½
   c) Anhydrous Copper(II) sulphate/$CUSO_4$(s)
2. a) To MgO, add excess HNO_3, ✓½ HCl or H_2SO_4 . Add NaOH or KOH or NH_4OH to the mixture, ✓½ Filter ✓ ½ and dry ✓½ the residue.
   b) – Anti-acid (Treatment of acid indigestion)
   - Making tooth past ✓1

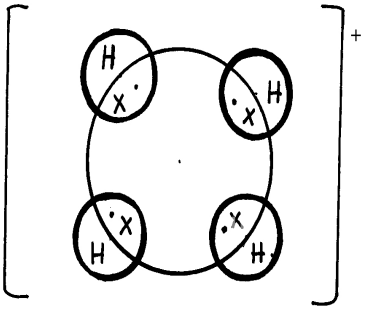
3. Add excess lead (II) Oxide to dilute nitric (v) acid and filter to get lead (II) nitrate solution. Add sodium carbonate solution to lead (II) nitrate to precipitate lead (II) carbonate and wash with distilled water.
4. a) Sodium nitrate/ sodium nitrite
   b) Black charcoal glows red
   Grey ash formed
   c) carbon (II) oxide

5. .a)

Particle	Mass number	Number of protons	Number of neutrons	Number of electrons
E	37	17	(i) 20	18
F	32	(ii) 16	16	16
G	(iii) 39	19	20	18
H	40	20	(iv)	18

   b) E,G and H
6. a) They became a white powder
   b) Efflorescency
7. Add water to sodium oxide to form sodium hydroxide solution. Bubble excess carbon (IV) oxide in sodium hydroxide solution to form sodium hydrogen carbonate. Heat sodium hydrogen carbonate solution to evaporate water. ✓½
8. NH_4Cl decomposes on heating to produce NH_3 and HCl (g). $NH_{3(g)}$ is lighter than $HCl_{(g)}$ hence diffuses faster and turns red-litmus to blue HCl is denser hence diffuses at a slower rate: changes blue litmus to red

9.



10. a) i) Hydroscopy// hygroscopic
    ii) Deliquescence// Deliquescent
    iii) Efflorescence// Efflorescent

    b) i) $Zn(OH)_4^{2-}$
    ii) $Cu(NH_3)_4^{2+}$

11. (a) (i) $2KNO_{3(s)} \quad 2KNO_{2(s)} + O2(g)$- ½mk for wrong states

(ii) $2AgNo_{3(s)} \quad 2Ag_{(s)} + 2NO_{2\,(g)} + O_{2\,(g)}$

12. (a) (i) Carbon (iv) Oxide

Dilute hydrochloric acid

(ii) $Mg(HCO_3)_{2(aq)} \quad MgCO_{3\,(s)} + H_2O_{(l)} + CO_{2(g)}$

(iii) Add sodium carbonate/any soluble carbonate (named) solution;

Filter

Dry the residue between two filter papers

13. a) magnesium Oxide

b) $2Mg_{(s)} + O2_{(g)}$ _____ $2MgO_{(s)}$

c) i) Sodium sulphate

ii) $MgCO_3$

d) $MgO_{(s)} + H_2SO_{4(aq)}$ _____ $M_gSO_{4(aq)} + H_2O_{(L)}$

e) $Mg^{2+}{}_{(aq)} + CO^{2-}{}_{3(aq)}$_____ $M_gCO_{3(s)}$

f) $M_gCO_{3(g)}$ _____ $M_gO_{(g)} + CO_{2(g)}$

g) Na^+ ions and SO_4^{2-} ions

h) Precipitation/ double decomposition

i) Crystals turn to a white powder. The salt is efflorescent hence it looses its water of crystallization forming a powder

14. a) i) Hydroscopy// hygroscopic

ii) Deliquescence// Deliquescent

iii) Efflorescence// Efflorescent

b) i) $Zn(OH)_4^{2-}$

ii) $Cu(NH_3)_4^{2+}$

15.

- Dissolve lead (ii) nitrate crystal in a given amount of distilled water in a beaker
- To dilute sulphuric✓½ (vi) acid in a beaker add magnesium✓½ oxide powder
- React the two solutions obtained
- Filter the mixture
- Dry the residue between filter papers to obtain a dry sample of lead (ii) sulphate

16. (a) Zinc oxide √1 ZnO (1 mk)

(b) $ZnO_{(s)} + H_2SO_{4(aq)}$ √1 $ZnSO_{4(aq)} + H_2O$ (1 mk)

3

(c) $Zn(OH)^{2-}{}_4$ √1 (1 mk)

17. (i) Efflorescence

(ii) $Na_2Co_3.10H_2O$ (If letters are joined – no mark)

18. (i) Pb^{2+} ✓ 1

(ii) White precipitate formed soluble in excess ✓ 1

19. Calcium oxide hygroscopic atmospheric water vapour ad becomes wet

Some laboratory gases are acidic

While calcium oxide is basic

Therefore calcium oxide reacts with the gas//calcium oxide would absorb the gas

20. A piece of marble chips was strongly heated in air for about 30 minutes. Some drops of water were added drop by drop to the product when it was still warm.

<u>Answers</u>

i) It decomposes to give Calcium oxide/Lime and Carbon (IV) oxide

$CaCO_{3(s)} \quad CaO_{(s)} + CO_{2(g)}$

ii) Alot of heat is evolved which makes the piece of lime swell hence the name quick lime and Calcium hydroxide(slaked lime) is formed. ✓ ½

$CaO(s) + H_2O(l)$ $Ca(OH)_2(aq)$ ✓1

21. a) i) Gas C $O_{2(g)}$ √ ½ Gas B NO_2 √ ½

ii) Zn^{2+} and NO_3^+ √ ½

b) $ZnO_{(g)} + 2HNO_{3\,(aq)}$ _____ $Zn(NO_3)_{2(aq)} + H_2O_{(l)}$
Balanced
State symbols
Chemical symbols

22. (a) Glowing splint is relighted/rekindles
(b) Pale yellow solid

23. a) Deliquescence√1
b) Deposition √1

24. a)- To MgO add excess HNO_3 √ ½ (Or HCL or H_2SO_4)
- Add NaOH or KOH or NH4 OH to the mixture √ ½
- Filter and dry the residue√1

b) Uses as
- Anti – acid or tooth paste √

25) - Dil NaOH may not absorb all the carbon (IV) oxide gas produced
- Candle may go off before all the oxygen is used due to build up carbon (IV) oxide

26 a) Acid salts $NaH_2PO_{4(S)}$ √1
Basic salts – M_g (OH) $CL_{(s)}$ √1
Normal salts – Ca $(NO_3)_{2(S)}$ √1
Double salt – $Fe(NH_4)_2$ $(SO_4)_2$ $6H_2O$√1

b) i) Hydrolysis – Reaction of water with a compound to form at least two products √1
ii) Moist litmus paper turns red due to the HCL gas produced √1
Or accept equation for the explanation
$FeCL_{3(S)} + 3H_2O_{(L)}$ $Fe\,(OH)_{3(S)} + 3HCl_{\,(g)}$