MARKING SCHEME
CHEMISTRY
FORM 3

1. a) i) B 2.8.2.
E 2.8.7

ii)

B^{2+}	E^{-}
+2	-1
2	1
x1	x2
	BE_2

b) Between C and D in the table

c) An atom of G has one more energy level than that of A. The valence eletron is therefore more loosely held by the positive nucleus and thus easier to remove.

ii) The atom of D has a bigger / stronger nuclear charge than that of C. The number of energy level pulled is the same.

iii) A is more reactive than B. This is because A loses only one electron while B looses two electrons to obtain an octet configuration.

More ionisation energy is requird for B to react than is required for A.

d) i) Noble gases

ii) Helium is used in weather balloons.

Neon is used in electric lamps.

e) The bond between B and chlorine is ionic formed by transfer of electrons from B to chlorine. On the other hand, the bond between C and chlorine is covalent, formed by equal sharing of electrons, hence a molecular compound.

2

1 (a) (i) Ammonia ✓1mk

(ii) Ammonium chloride ✓1mk

(iii) Sodium hydrogen carbonate. ✓1mk

(iv) Calcium chloride/water ✓1mk

(b) $Ca(OH)_{2(aq)} + 2NH_4Cl_{(aq)} \rightarrow CaCl_{2(aq)} + 2H_2O_{(l)} + 2NH_{3(g)}$

(c) $CaCO_3$, CO_2, NH_3, Brine – Names only

(d) (i) CO_2, NH_3, water – Accept names only

(ii) - Is denser than air. ✓1mk

- Doesn't support combustion. ✓1mk

(iii) There is formation of $PbSO_4$, ✓½mk which is insoluble, ✓½mk

The $PbSO_4$ coats $PbCO_3$, ✓½mk this stops further reaction. ✓½mk

3.a) Under similar conditions of temperature and pressure, the rate of diffusion of a gas is inversely proportional to the square root of its density.

b) i) Yellow solid deposited.

ii) X close to Cl_2 end

iii) If $45cm^3 \rightarrow 15$ sec

then $135\ cm^3 \rightarrow \frac{135 \times 15}{45} = 45$ sec ✓1

$$Now \frac{T_{Cl_2}}{T_{H_2S}} = \frac{\sqrt{RMM_{Cl_2}}}{\sqrt{RMM_{H_2S}}}$$

$$\Rightarrow \frac{45\,\text{sec}}{T_{H_2S}} = \frac{\sqrt{71}}{\sqrt{34}}$$

$$\Rightarrow T_{H_2S} = \left(\frac{45\sqrt{34}}{\sqrt{71}}\right) = 31.14\,\text{sec}$$

4. a) Charles law states that, the volume of a given mass of a gas is directly proportional to its absolute temperature at constant pressure.

b) i)

Time (°C)	0	20	40	60	80	100	120
Temp. (k)	273	293	313	333	353	373	393

@½ mark

ii)

iii) Extrapolation ✓½

Value = -271 ± 2 ✓½

iv) Read from the graph

Volume at -225°C = 5cm³ ± 0.1 ✓

)

$$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$$

$$P_1 = P_2 = Atmospheric\ pressure$$

$$\frac{V_1}{T_1} = \frac{V_2}{T_2}$$

$$V_1 = 100cm^3$$

$$T_1 = 25 + 273 = 298K$$

$$T_2 = 40 + 273 = 313K$$

$$V_2 = ?$$

$$V_2 = \frac{V_1 \times T_2}{T_1}$$

$$= \frac{100 \times 313}{298}$$

$$= 105cm^3$$

a)fractionating column.To enhance successive condensation and evaporation

b) Leibig condenser.

c) Point X

d) ethanol