

FORM 4 MID TERM 2 2020

CHEMISTRY PAPER 1

1. Atoms of element X exists as ${}^{146}X$ and ${}^{126}X$.

(a) What name is given to the types of atoms.

(1mk)

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(b) Draw a diagram to illustrate the atomic structure of **x**. (1mk)

(c) Write the formula of the oxide of **x** .(Atomic number of O = 8) (1mk)

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2. Describe how you would prepare a dry sample of lead (II) chloride with lead (II) carbonate. (3mks)

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3. What volume of 0.5M hydrochloric acid solution will neutralize 20cm³ solution of sodium carbonate containing 5.3 of anhydrous sodium carbonate per litre of solution .
(Na = 23.0 C = 12.0 O = 16.0 H = 1.0 Cl = 35.5) (3mks)

4. Study the equilibrium between gases **C** and **D** below:



(a) Sketch the graph of the variation of the concentration of gas **D** with time. (2mks)

(b) Explain the shape of the curve you have drawn in 4 (a) above. (1mk)

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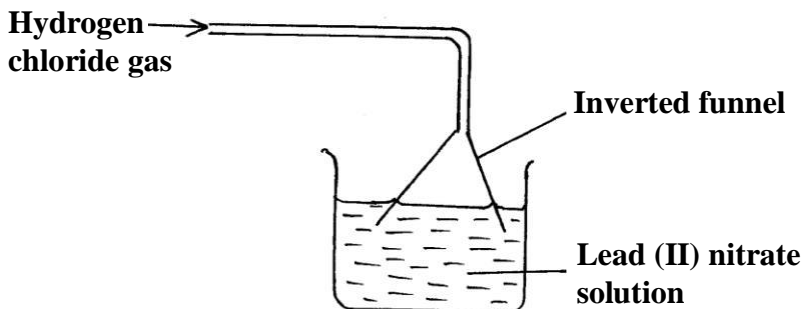
5. Give **two** reasons why dry ice (solid carbon (IV) oxide) is preferred in the preservation of perishable foodstuffs.(2mks)

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6. When 20.3g of a hydrated salt (**Y**.6H₂O) was heated to dryness,9.5 g of the anhydrous salt was obtained. Determine the relative formula mass of the hydrated salt. (H = 1.0 O = 16.0) (3mks)



7. Study the set up below and answer the questions that follow.



(a) Why is the gas dissolved using an inverted funnel? (1mk)

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(b) State and explain the observations that would be made in the beaker. (2mks)

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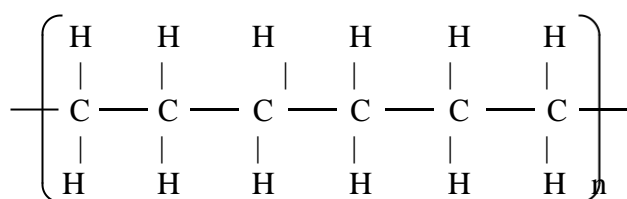
8. The information in the table below relates to the element in the same group of the periodic table Study it and answer the questions that follow.

Element	A	B	C
Atomic radius	0.18	0.23	0.15

Which element has the highest ionization energy? Explain (2mks)

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9. The diagram below shows part of the structure of a polymer.



(a) Write the formula of the monomer. (1mk)

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(b) If a sample of the polymer has a mass of 28125g, estimate the number of molecules of the monomer in it. (C=12.0 H = 1.0 Cl = 35.3) (2mks)

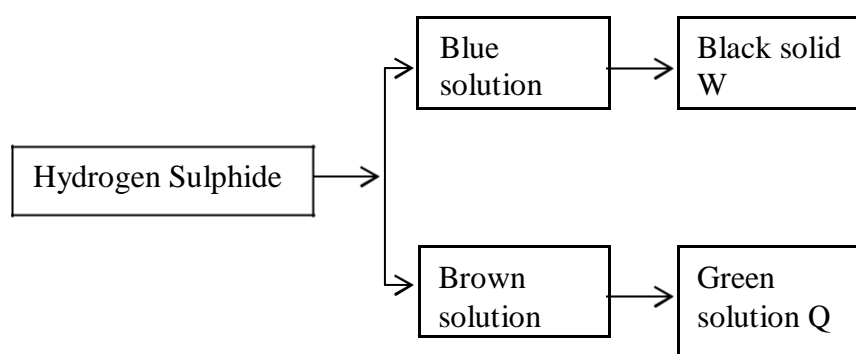
10. A solid mixture consists of substances **U** and **V**, whose solubility at 25°C and 60°C are shown in the table below.

Substance	Solubility at (g/100g of water)	
	25oC	60oC
U	70.00	0.02
V	63.00	82.00

Describe how you would separate **U** and **V**. (3mks)

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11. Hydrogen sulphide gas is bubbled into two solutions of metallic nitrate as represented in the flow chart below:



(a) Identify the cation present in:

(i) Blue solution (1mk)

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(ii) Brown solution (1mk)

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(b) Write an ionic equation for the formation of green solution Q. (1mk)

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12 (a) Using dots (●) and cross (x) shows the bonding in hydroxonium ion (H₃O⁺)

(Atomic numbers H = 1 O = 8) (2mks)

(b) Chlorine has a very low melting and boiling points yet the atoms are joined by strong covalent bond. Explain.

(1mk)

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13. The table below gives the melting points of oxides of elements in period 3. Study it and answer the questions that follow.

Formula of oxide	Na ₂ O	MgO	Al ₂ O ₃	SiO ₂	P ₄ O ₁₀	SO ₃
Melting point (°C)	1190	3080	2050	1730	560	-73

(a) Identify the compound in the above table that will dissolve in dilute hydrochloric acid and dilute sodium hydroxide. (1mk)

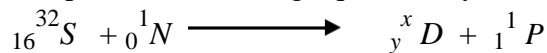
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(b) Explain the difference in melting points of MgO and P₄O₁₀ (2mks)

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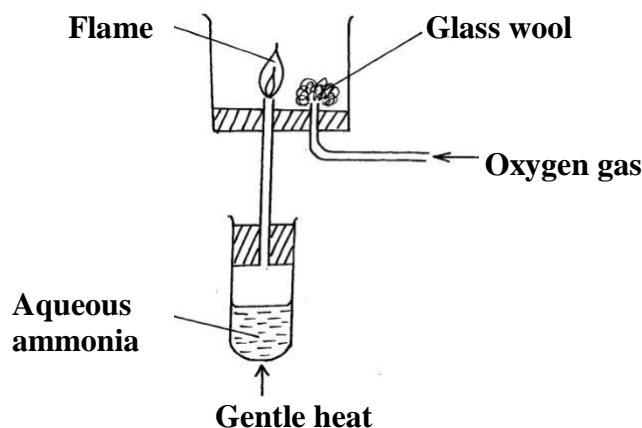
14 (a) Complete the following equations by showing the value of *x* and *y* (1mk)



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(b) Copper – 64 has half –life of 12.8days. What mass of copper – 64 will remain after 51.2 days starting with 20g of the isotope? (2mks)

15. Study the diagram below and answer the questions that follow:



(a) Why is aqueous ammonia warmed gently ? (1mk)

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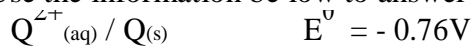
(b) What is the colour of the flame? (1mk)

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(c) Write an equation for the reaction that produces the flame. (1mk)

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16. Use the information below to answer the questions that follow:



(a) Write the cell equation for the cell. (1mk)

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(b) Calculate the E^{\ominus} value for the cell reaction. (2mks)

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17. Given the following information about aqueous solutions of y and x

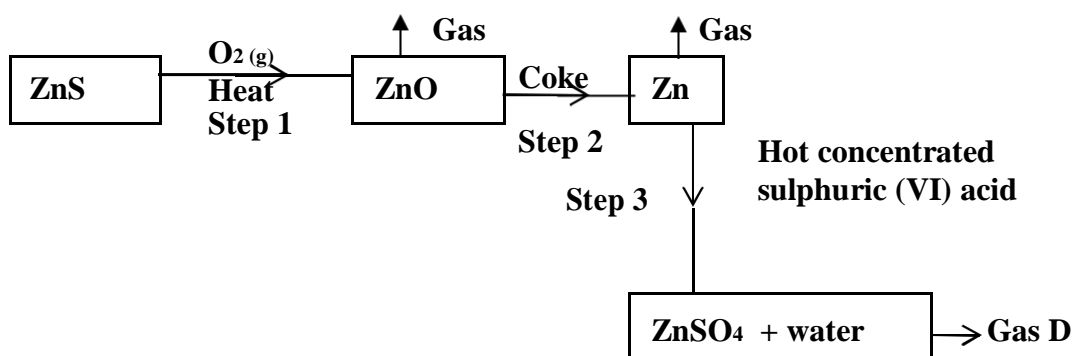
Aqueous solution	pH	Electrical conductivity
x	6	1.3
y	2	2.8

Explain why y has a higher electrical conductivity than x. (2mks)

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18. Study the flow chart below and answer the questions that follow:



(a) State the condition necessary for the reaction in step 2 to occur (1mk)

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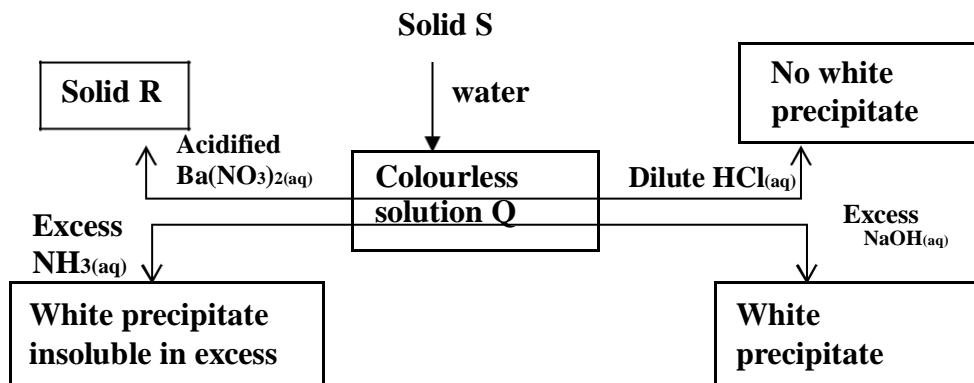
(b) Name:

(c) (i) Gas D (1mk)

(ii) One use of zinc (1mk)

19. Calcium carbonate decomposes on heating producing a gaseous product and a residue. What volume of gaseous product at s.t.p is produced from 2.5 g of the carbonate . (Ca = 40.0 C = 12.0 O = 16.0, molar gas volume at s.t.p = 22400cm³) (2mks)

20. Study the scheme below and answer the questions that follow.



(a) Identify solution Q and solid R

- (i) Solution Q (1mk)
- (ii) Solid R (1mk)

(b) Write an ionic equation for the reaction between solution Q and excess aqueous ammonia. (1mk)

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21. Name the process which takes place when:

(a) Iodine changes directly from solid to gas. (1mk)

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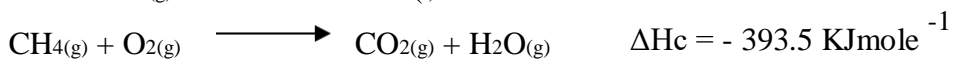
(b) Fe²⁺_(aq) changes to Fe³⁺_(aq) (1mk)

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(c) White sugar changes to black solid when mixed with excess concentrated sulphuric (VI) acid. (1mk)

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22. The equations below shows the molar enthalpies of combustion of carbon, hydrogen and methane.



Use an energy cycle diagram to calculate the heat of formation of methane. (3mks)

23. In an experiment, soap solution was added to three separate sample of water. The table below shows the volumes of soap solution required to form lather, with 100cm³ of each sample of water before and after boiling.

	Sample I	Sample II	Sample III
Volume of soap before water is boiled (cm ³)	27.0	3.0	10.6
Volume of soap after water is boiled (cm ³)	27.0	3.0	3.0

(a) Which water is likely to be soft water? Explain (2mks)

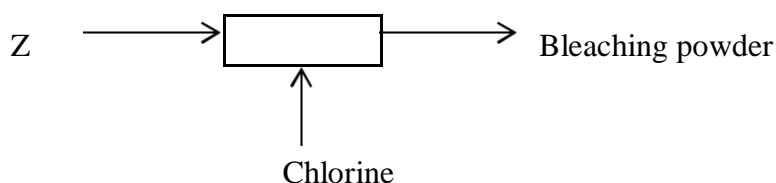
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(b) Explain the change in the volume of soap solution used in sample III (1mk)

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24. 60cm³ of sulphur (IV) oxide diffuses through a porous pot in 4seconds. How long would it take 100cm³ of oxygen gas to diffuse through the same pot under the same conditions? (S = 32.0 O = 16.0) (3mks)

25. Study the diagram below and answer the questions that follow:



(a) Name substance Z (1mk)

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(b) Write an equation for the reaction between substance Z and chlorine gas. (1mk)

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26. Ethene and ethyne are unsaturated hydrocarbons.

(a) Explain what is meant by unstauration in hydrocarbons (1mk)

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(b) Explain how you would distinguish between ethyne and ethane. (2mks)

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27. Nitrogen (IV) oxide gas can be obtained by thermal decomposition of lead (II) nitrate crystals.

(a) Write an equation for the thermal decomposition of lead (II) nitrate crystals. (1mk)

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(b) Explain how nitrogen (IV) oxide can be separated from the mixture of gases liberated. (2mks)

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28. (a) Name **two** allotropes of carbon. (1mk)

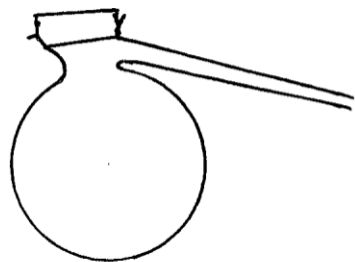
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(c) Give **two** reasons why carbon (IV) oxide can be used to extinguish fires. (2mks)

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29. Name the apparatus below. (1mk)



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