CHEMISTRY DEPARTMENT

S.6 BRAINSTORMING TEST

TOPIC; TRANSITION ELEMENTS

SUB-TOPIC; INTRODUCTION TO TRANSITION

NAME_____

Signature _____ **STREAM**_____

Instructions; Attempt **all** questions in this paper.

Where necessary, Cr = 24, Mn =25, Cu= 29, Fe= 26

1. What is meant by

(i) a d-block element (01 mark)

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(ii) transition element (01 mark)

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(b) State any three characteristics of transition elements (03 marks)

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(c) State the electronic configuration of each of the following

(i) Cr (atomic number= 24)

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(ii) Copper (atomic number =29)

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(iii) Manganese(ii) ion

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(iv) Copper(i) ion

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(v) Iron(iii) ion

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2. Explain why

(i) scandium and zinc are not typical transition elements (03marks)

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(ii) the melting points of d-block elements generally increase from scandium to chromium and decrease from iron to copper.

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(iii) Chromium has a higher melting point than calcium (02 marks)

3. (a) What is meant by the following terms?

(i) Oxidation state (01mark)

(ii) Complex ion (01 mark)

(b) Explain why cobalt

(i) has variable oxidation states. (03 marks)

(iii) forms complexes (03 marks)

(ii) acts as a catalyst in some reactions. (03 marks)

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4. Chromium and Cobalt can form species of formulae, **$CrCl_3 \cdot 6H_2O$** and $Co(NH_3)_5SO_4Br$ respectively and each forms isomers. In the table below, state the formula and IUPAC name of any two isomers formed by each of the species.

species	**Formula of isomer.**	**Name of the isomer formed.**
$CrCl_3 \cdot 6H_2O$		
$Co(NH_3)_5SO_4Br$		

(b) (i) Name one reagent that can be used to distinguish the two isomers in **$Co(NH_3)_5SO_4Br$** **(01 mark)**

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(ii) In each case state what is observed when the isomers are separately treated with the reagent you have named. (02marks)

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Species	Coordination number	Name of the complex
$Co(NH_3)_6^{3+}$		
$Cr(CO)_6$		
$Co(CN)_6^{3-}$		
$[Co(NO_2)_6]^{3-}$		
$[Ni(NH_3)_6](NO_3)_3$		
$Cr(H_2O)_5Cl]^{2+}$		
$[Fe(CN)_6]^{4-}$		
$[CoCl_4]^{2-}$		