CHEMISTRY DEPARTMENT

S.6 BRAINSTORMING TEST

TOPIC; TRANSITION ELEMENTS

SUB-TOPIC; CHEMISTRY OF COBALT

NAME_____

Signature _____ **STREAM**_____

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

1. (a) Write

(i) The electronic configuration of cobalt atom (atomic number =27) (01 mark)

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(ii) The all the possible oxidation states of cobalt. (01 mk)

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b) (i) State the most common oxidation state of cobalt.

_____

c) (i)Write the formulae of the oxide of cobalt in each of the above oxidation states. (1 mark)

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(ii) State three reasons why cobalt is a transition element. (03marks)

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(c) Explain why cobalt

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

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(iii) forms complexes (03 marks)

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

2. Cobalt forms species of formulae, $CoCl_3 \cdot 6NH_3$ and $Co(NH_3)_5SO_4Br$ 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.**
$CoCl_3 \cdot 6NH_3$		
$Co(NH_3)_5SO_4Br$		

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

(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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3. (a) State what is observed and write an equation for the reaction when cobalt(II) sulphate solution is added each of the following

(i) Concentrated hydrochloric acid

Observation

_____

Equation (1½ marks)

_____

(ii)Sodium hydroxide solution drop-wise until in excess and exposed to air.

Observation (01 mark)

_____

Equation(s) (03 marks)

_____

_____

(ii) Ammonia solution drop wise until in excess.

Observation (01 mark)

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Equation(s) (03 marks)

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_____

(iii) Potassium thiocyanate solution.

Observation

_____

Equation (1½ marks)