CHEMISTRY DEPARTMENT 2023
S.6 BRAINSTORMING TEST
TOPIC; TRANSITION ELEMENTS
SUB-TOPIC; CHEMISTRY OF MANGANESE

NAME……**INDEX number**…….

Signature …… **STREAM** …….
Instructions; Attempt **all** questions in this paper.

1. (a) Write
(i) The electronic configuration of manganese atom (atomic number =25) (01 mark)

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

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b) (i) State the most common oxidation states of manganese

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(ii)Which one is the stable state of manganese and why? (01 mark)

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(c) Explain why manganese
(i) is a transition element. (01 mark)

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(ii) has variable oxidation states. (01 mark)

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(iii) has a higher melting point than calcium (01 mark)

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2. (a) Write equations for the reactions when the following are heated strongly to a constant mass

(i) $MnCO_3$ (1½ marks)

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(ii) $Mn(NO_3)_2$ (1½ marks)

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(iii) MnC_2O_4 (1½ marks)

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b) Write an equation for the reaction of manganese with

(i) Air (1½ marks)

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(ii) Water (1½ marks)

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(iii) dilute acids (03 marks)

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(iv) Concentrated acids. (03 marks)

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(v) chlorine (1½ marks)

3. (a) Write an equation for reaction manganate(vi) in

(i) neutral medium ($1\frac{1}{2}$ marks)

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(ii) alkaline medium ($1\frac{1}{2}$ marks)

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b) Carbon dioxide was bubbled through potassium manganate(vi) solution

(i) State what was observed. (01 mark)

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(ii) Write an equation for the reaction ($1\frac{1}{2}$ marks)

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4. (a)(i) Define a primary standard. (01 mark)

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(ii) State two reasons why potassium manganate(vii) is not a good primary standard. (02 marks)

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b) State two advantages of using potassium manganate(vii) in volumetric analysis. (02 marks)

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(c) Explain briefly why hydrochloric acid and nitric acid are not used for Acidifying potassium permanganate solution during volumetric analysis

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(d) Write half equations for the reduction of potassium permanganate in

(i) strongly acidic medium (1½ marks)

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(ii) strongly alkaline medium (1½ marks)

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5. (a) State what would be observed and write the equations for the reactions when each of the following reagent is treated with an aqueous solution of manganese(ii) sulphate

(i) lead(IV) oxide in the presence of conc. Nitric acid

Observation

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Equation (1½ marks)

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(ii) solid sodium bismuthate and conc. Nitric acid

Observation

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Equation (1½ marks)

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(ii) aqueous ammonia solution drowise until in excess

Observation

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Equation (1½ marks)

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(iii) Sodium hydroxide solution drowise until in excess

Observation

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Equation (1½ marks)

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(iii) hydrogen sulphide gas

Observation

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Equation (1½ marks)

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END.