P. P. SAVANI UNIVERSITY

Third Semester of B.Sc. Examination

December-2021

SSCH2030–Periodic properties of s & d block elements

08.12.2021, Wednesday Time: 09:00 a.m. to 11:30 a.m. Maximum Marks: 60

Instructions:

1. The question paper comprises of two sections.
2. Section I and II must be attempted in separate answer sheets.
3. Make suitable assumptions and draw neat figures wherever required.
4. Use of scientific calculator is allowed.

Section-I (Total Marks - 30)

Q.1 Short Questions **[10]**

1.1 Objectives **[05]**

1.1a Name the first and last elements of 3d-series

A Sc, Zn
B Hg, Mo
C Co, Ni
D Ti, Zn

1.1b Which of the elements have half-filled d-orbitals.

A Fe, Cr
B Cr, Cu
C Zn, V
D Cr, Mn

1.1c $M + 2HCl \rightarrow \_\_\_ + H_2$

A MCl_2
B MCl_3
C MCl_4
D MCl

1.1d Which of the alkali metals have high melting point and high boiling point?

A K
B Li
C Na
D Cs

1.1e The hydration enthalpies of alkali metal ions ___ with ____ in ionic sizes.

A Decreases, increases
B Decreases, decreases
C Increases, decreases
D Increases, Increases

1.1f Plaster of Paris?

A $CaCO_3$
B $CaSO_4.H_2O$
C NaOH
D CaO

1.1g What is the oxidation state of K in KO_2?

A +1
B 0
C +2
D +3

1.1h The alkali metals react with water to form _____?

A Hydroxide
B Alkoxide
C Oxide
D Halide

1.1i Which of the compounds are ionic?

A VCl_2 , $MnCl_2$
B VCl_4 ,$MnCl_4$
C $MnCl_4$, VCl_2
D VCl_4, VCl_2

1.1j Density of d-block elements are_____ than s & p block element?

A Higher
B Lower
C Equal
D Slightly lower

1.2 Answer the Following: (MCQ/Short Question/Fill in the Blanks) **[05]**

1.2a $2BeCl_2 + LiAlH_4 \rightarrow$ _____ + _____ + _____

1.2b Mn _____ reducing property than Cr higher stability of half-filled d^5 configuration of Mn^{2+}? (higher/lower)

1.2c Ti^{2+}, Mn^{2+} are _____ in nature? (Paramagnetic/ diamagnetic)

1.2d Why transition metals are colored?

1.2e Write one use of $CaCO_3$?

Q.2 Short Notes (Attempt any two) **[06]**

A Write the structure of $BeCl_2$?

B Discuss the diagonal Relationship between Beryllium and Aluminium, only three reasons?

C Explain the magnetic properties of transition elements?

Q.3 Explain in detail (Attempt any two) **[14]**

A Draw the diagram of Splitting of d orbital energies by an octahedral field of ligands? Calculate the magnetic moment of Ti^{2+} and Sc^{3+}?

B (i) Transition elements form alloys easily, state the reason?
(ii) Discuss the magnetic properties of transition elements?

C Discuss about the properties, chemical reactions, and applications of Calcium Hydroxide ($Ca(OH)_2$)?

Section-II (Total Marks - 30)

Q.1 Short Questions **[10]**

1.1 Objectives **[05]**

1.1a Symbol of Potassium Permanganate

A $KMnO_4$
B K_2MnO_4
C MnO_2
D Mn_2O_7

1.1b Symbol of Potassium ferrocyanide is

A $K_4[Fe(CN)_6]\cdot 3H_2O$
B $CaK_2[Fe(CN)_6]$
C $Ca_2[Fe(CN)_6]\cdot 11H_2O$
D $[Fe(CN)_6]^{4-}$

1.1c Name of chemical compound, K2Cr207

A Caustic Soda
B Potassium Dichromate
C Methyl Orange
D Chromyl Chloride

1.1d Symbol of chromite ore

A $FeO\cdot Cr_2O_3$
B $Na_2Cr_2O_7$
C $CuSO_4$
D $TiCl_4$

1.1e Oxidation of Co in Sodium hexanitrocobaltate (III).

A 3+
B 2+
C 0
D 1+

1.1f Formula of Green vitriol

A NaCl
B H_2SO_4
C $FeSO_4.7H_2O$
D H_2O_2

1.1g Symbol of Magnetite

A Fe_3O_4
B FeS_2
C $FeCO_3$
D Fe_2O_3

1.1h Name of the compound which is used for detection of cysteine

A Nitroprusside
B ferricyanide
C Cobalt acetate
D Sodium cobaltnitrite

1.1i Formula of petigot's salt

A $KCrO_3Cl$
B K_2CO_3
C $K_2Cr_2O_7$
D CrO_5

1.1j Write the common name of $[Co(NH_3)_6Cl_3]$

A Hexaaminecobalt (III)chloride
B Magnetite
C Sodium nitroprusside
D Potassium ferrocyanide

1.2 Answer the Following: (MCQ/Short Question/Fill in the Blanks) **[05]**

1.2a $K_2Cr_2O_7 + 2HCl \rightarrow$ ____ + ____

1.2b Write one Use of Cr?

1.2c Write one reaction of Ferrochrome?

1.2d Name the Oxidation state of Cr which is highly stable at acidic solutions?

1.2e Write one use of sodium nitroprusside?

Q.2 Short Notes (Attempt any two) **[06]**

A Draw the structure of chromate and dichromate ions with formula?

B Write the electronic configurations of Fe(II) and Fe(III) and state which is more stable with reasons?

C Write the formula of sodium nitroprusside and Calculate the oxidation state of Fe in sodium nitroprusside?

Q.3 Explain in detail (Attempt any two) **[14]**

A Discuss the types of Iron in detail?

B Discuss the structure, synthesis, properties and uses of about the Potassium ferrocyanide?

C Discuss the comparison of cast iron, wrought iron and steel?