



WEIRD CHEMIST

d-Block Elements

Potassium Dichromate ($K_2Cr_2O_7$)

DPP – 07

Topic: $K_2Cr_2O_7$

Questions: 45 Questions

Exam: NEET / JEE

► TYPE 1 : Preparation from Chromite Ore

Q1. The coloured product obtained on reaction of ferrous chromate with sodium carbonate in free access of air is [NCERT Pg. 231]

- (1) Purple solution of ferric dichromate
- (2) Yellow solution of sodium chromate
- (3) Green solution of sodium dichromate
- (4) Brownish solution of ferrous oxide

Q2. Chromite ore $\xrightarrow{Na_2CO_3 + O_2}$ A $\xrightarrow[NaOH]{H_2SO_4}$ B
The anions present in products A and B is/are

- (1) $A = Cr_2O_4^{2-}$
- (2) $B = Cr_2O_7^{2-}$
- (3) $A = CrO_4^{2-}$
- (4) Both (2) & (3)

Q3. $FeCr_2O_4 + Na_2CO_3 + O_2 \rightarrow ?$ Which product is obtained?

- (1) $Na_2CrO_4 + Fe_3O_4 + CO_2$
- (2) $Na_2CrO_4 + Fe_2O_3 + CO_2$
- (3) $Na_2Cr_2O_7 + Fe_2O_3 + CO_2$
- (4) $Na_2Cr_2O_7 + Fe_2O_3 + CO$

Q4. What will be the mole ratio of reactants in the following (unbalanced) reaction?
 $FeCr_2O_4 + Na_2CO_3 + O_2 \rightarrow Na_2CrO_4 + Fe_2O_3 + CO_2$

- (1) 2:4:7 (2) 4:6:6 (3) 4:8:7 (4) 4:8:4

Q5. What will be the mole ratio of products in the following (unbalanced) equation?
 $FeCr_2O_4 + Na_2CO_3 + O_2 \rightarrow Na_2CrO_4 + Fe_2O_3 + CO_2$

(1) 8:2:8

(2) 8:4:8

(3) 4:4:8

(4) 8:2:6

Q6. $\text{FeCr}_2\text{O}_4 + \text{Na}_2\text{CO}_3 + \text{O}_2 \rightarrow \text{X} + \text{Y} + \text{CO}_2$

Mention X and Y

(1) $\text{X} = \text{Na}_2\text{Cr}_2\text{O}_7$, $\text{Y} = \text{Fe}_3\text{O}_4$

(2) $\text{X} = \text{Na}_2\text{CrO}_4$, $\text{Y} = \text{Fe}_3\text{O}_4$

(3) $\text{X} = \text{Na}_2\text{CrO}_4$, $\text{Y} = \text{Fe}_2\text{O}_3$

(4) $\text{X} = \text{Na}_2\text{Cr}_2\text{O}_7$, $\text{Y} = \text{Fe}_2\text{O}_3$

▶ TYPE 2 : Structure & Bonding

Q7. In the dichromate ion

[NCERT Pg. 232]

(1) All eight Cr–O bonds are equivalent and have a Cr–O–Cr bond

(2) Six Cr–O bonds are equivalent and have a Cr–Cr bond

(3) Six Cr–O bonds are equivalent and have a Cr–O–Cr bond

(4) Four Cr–O bonds are equivalent and have a Cr–Cr bond

Q8. (Cr–O–Cr) bond angle in $\text{Cr}_2\text{O}_7^{2-}$ is nearly

(1) 126°

(2) 105.5°

(3) 150°

(4) 97°

Q9. Which is the correct statement about $\text{Cr}_2\text{O}_7^{2-}$ structure?

(1) It has neither a Cr–Cr bond nor an O–O bond

(2) It has one Cr–Cr bond and six O–O bonds

(3) It has no Cr–Cr bond but has six O–O bonds

(4) It has one Cr–Cr bond and seven Cr–O bonds

Q10. In the dichromate dianion:

(1) 4 Cr–O bonds are equivalent

(2) 6 Cr–O bonds are equivalent

(3) All Cr–O bonds are equivalent

(4) All Cr–O bonds are non-equivalent

▶ TYPE 3 : Colour & Charge Transfer

Q11. The colour of $\text{K}_2\text{Cr}_2\text{O}_7$ and Fe^{2+} ions are respectively due to

(1) *d-d* transition and charge transfer spectra

- (2) Charge transfer spectra and $d-d$ transition
- (3) Crystal defects and charge transfer spectra
- (4) Charge transfer spectra and crystal defects

Q12. CrO_3 is coloured due to

- (1) Crystal defect
- (2) Unpaired electrons
- (3) Charge transfer spectra
- (4) Low I.E.

▶ **TYPE 4 : Chromate–Dichromate Equilibrium & pH-Dependent Inter-conversion**

Q13. The equilibrium $2\text{CrO}_4^{2-} \rightleftharpoons \text{Cr}_2\text{O}_7^{2-}$ shifts to the right in

[NCERT Pg. 232]

- (1) Acidic medium
- (2) Basic medium
- (3) Neutral medium
- (4) Faintly alkaline medium

Q14. $\text{Cr}_2\text{O}_7^{2-} \xrightleftharpoons[pH=Y]{pH=X} \text{CrO}_4^{2-}$

The values of Y and X respectively are

This numeric pH pair differs from the one given as correct in Q.17 – both test the same chromate/dichromate pH-interconversion fact but the two sources disagree on the exact value. Worth checking against your reference.

- (1) 3, 8
- (2) 8, 4
- (3) 8, 10
- (4) 10, 2

Q15. The yellow colour of chromates changes to orange on acidification due to formation of

- (1) Cr^{3+}
- (2) Cr_2O_3
- (3) $\text{Cr}_2\text{O}_7^{2-}$
- (4) CrO_4^-

Q16. When dil. H_2SO_4 is added to an aqueous solution of potassium chromate, the yellow colour of the solution turns to orange colour. It indicates

- (1) Chromate ions are reduced
- (2) Chromate ions are oxidised
- (3) Monocentric complex is converted into dicentric complex
- (4) Oxygen gets removed from chromate ions

Q17. CrO_4^{2-} (yellow) changes to $\text{Cr}_2\text{O}_7^{2-}$ (orange) at $\text{pH} = x$ and vice-versa at $\text{pH} = y$. Hence, x and y are

Compare with Q.14 – the two questions test the same interconversion but again disagree on the specific pH values.

(1) 6, 8

(2) 6, 5

(3) 8, 6

(4) 7, 7

Q18. What are the species X and Y in the following?



(1) CrO_4^{2-} , $Cr_2O_7^{2-}$

(2) CrO_3 , Cr_2O_3

(3) H_2CrO_4 , $H_2Cr_2O_7$

(4) CrO_3 , CrO_4^{2-}

Q19. $X + H^+ \rightarrow Y + Na^+ + H_2O$



Mention X and Y

Formula subscripts standardised from the scanned copy (garbled as "Na₂Cr₇O₇"-style notation) to consistent Na₂CrO₄ / Na₂Cr₂O₇ formulas.

(1) X = Na₂Cr₂O₇, Y = Na₂CrO₄

(2) X = Na₂Cr₂O₇, Y = Na₂Cr₂O₇

(3) X = Na₂CrO₄, Y = Na₂Cr₂O₇

(4) X = Na₂CrO₄, Y = Na₂CrO₄

Q20. The yellow colour of chromates changes to orange on acidification due to formation of.

Same as Q.15.

(1) Cr^{3+}

(2) Cr_2O_3

(3) $Cr_2O_7^{2-}$

(4) CrO_4

Q21. The yellow colour solution of Na₂CrO₄ changes to orange red on passing CO₂ gas due to the formation of:-

(1) CrO_5

(2) CrO_3

(3) Na₂Cr₂O₇

(4) Cr_2O_3

Q22. The yellow colour of chromates changes to orange on acidification due to formation of:

Same as Q.15 and Q.20.

(1) Cr^{3+}

(2) Cr_2O_3

(3) $Cr_2O_7^{2-}$

(4) CrO_4^-

► TYPE 5 : Chromyl Chloride Test

Q23. Chromyl chloride test is not given by

(1) $HgCl_2$

(2) $PbCl_2$

(3) $AgCl$

(4) All of these

Q24. Which of the following statement(s) is/are correct when a mixture of NaCl and K₂Cr₂O₇ is gently warmed with conc. H₂SO₄?

- (1) A deep red vapour is evolved
- (2) Chromyl chloride is formed
- (3) Chlorine gas is evolved
- (4) Both (1) & (2)

Q25. Which of the following gives the chromyl chloride test:–

- (1) KCl
- (2) PbCl₂
- (3) HgCl₂
- (4) All

▶ TYPE 6 : Reaction with H₂O₂ (Perchromic Acid / CrO₅ Blue Test)

Q26. When H₂O₂ is added to acidified K₂Cr₂O₇, in ether a blue colour is formed due to the formation of

- (1) CrO₃
- (2) CrO₅
- (3) Cr₂O₃
- (4) CrO

Q27. Acidified solution of chromic acid on treatment with H₂O₂ gives blue colour which is due to

- (1) CrO₃ + H₂O + O₂
- (2) Cr₂O₃ + H₂O + O₂
- (3) CrO₅ + H₂O
- (4) H₂Cr₂O₇ + H₂O + CO₂

Q28. The blue colour produced on adding H₂O₂ to acidified K₂Cr₂O₇ is due to the formation of

Same as Q.26.

- (1) CrO₅
- (2) Cr₂O₃
- (3) CrO₄²⁻
- (4) CrO₃

**Q29. $K_2Cr_2O_7 + H_2SO_4 + 4H_2O_2 \rightarrow K_2SO_4 + 5H_2O + A$
Product (A) is.**

- (1) Cr₂O₃
- (2) CrO₅
- (3) CrO
- (4) CrO₃

Q30. What change does not occur when K₂Cr₂O₇ reacts with H₂O₂ solution:–

- (1) Orange colour of solution turns blue
- (2) Oxidation state of Cr atom decreases
- (3) O.S. of Cr atom remains constant
- (4) None of these

Q31. K₂Cr₂O₇ on reaction with H₂O₂ gives a blue coloured compound in which the oxidation state of the metal is:–

- (1) +6 (2) +3 (3) +2 (4) +4

Q32. Acidified chromic acid + H_2O_2 $\xrightarrow{\text{Organic solvent}}$ X + Y (Blue)
X and Y are:-

Same as Q.27.

- (1) CrO_5 and H_2O (2) Cr_2O_3 and H_2O (3) CrO_2 and H_2O (4) CrO and H_2O

► **TYPE 7 : Redox Reactions & Thermal Decomposition (Oxidising Agent)**

Q33. Equivalent weight of $\text{K}_2\text{Cr}_2\text{O}_7$ in acidic medium is equal to

- (1) $M/2$ (2) $M/5$ (3) $M/6$ (4) $M/8$

Q34. Which one of the following statements is correct when SO_2 is passed through acidified $\text{K}_2\text{Cr}_2\text{O}_7$ solution? [NEET-2016]

- (1) Green $\text{Cr}_2(\text{SO}_4)_3$ is formed
(2) The solution turns blue
(3) The solution is decolourised
(4) SO_2 is reduced

Q35. Acidified $\text{K}_2\text{Cr}_2\text{O}_7$ solution turns green when Na_2SO_3 is added to it. This is due to the formation of [AIPMT (Prelims)-2011]

- (1) CrSO_4 (2) $\text{Cr}_2(\text{SO}_4)_3$ (3) CrO_4^{2-} (4) $\text{Cr}_2(\text{SO}_3)_3$

Q36. $4\text{K}_2\text{Cr}_2\text{O}_7 \xrightarrow{\Delta} 4\text{K}_2\text{CrO}_4 + 3\text{O}_2 + \text{X}$, in this reaction X is

- (1) CrO_3 (2) Cr_2O_7 (3) Cr_2O_3 (4) CrO_5

Q37. Ammonium dichromate is used in fireworks. The green coloured powder blown into the air is

- (1) CrO_3 (2) Cr_2O_3 (3) Cr (4) $\text{CrO}(\text{O})_2$

Q38. When an acidified solution of $\text{K}_2\text{Cr}_2\text{O}_7$ is shaken with an aqueous solution of FeSO_4 then.

- (1) $\text{Cr}_2\text{O}_7^{2-}$ ion is reduced to Cr^{3+} ions
(2) $\text{Cr}_2\text{O}_7^{2-}$ ion is converted to CrO_4^{2-} ions
(3) $\text{Cr}_2\text{O}_7^{2-}$ ion is reduced to Cr
(4) $\text{Cr}_2\text{O}_7^{2-}$ ion is converted to CrO_3

Q39. Acidified $\text{K}_2\text{Cr}_2\text{O}_7$ solution turns green when Na_2SO_3 is added to it. This is due to the formation of.

Same as Q.35.

- (1) $\text{Cr}_2(\text{SO}_4)_3$ (2) CrO_4^{2-} (3) $\text{Cr}_2(\text{SO}_3)_3$ (4) CrSO_4

Q40. When acidified $\text{K}_2\text{Cr}_2\text{O}_7$ solution is added to Sn^{2+} salts then Sn^{2+} changes to:–

- (1) Sn (2) Sn^{3+} (3) Sn^{4+} (4) Sn^+

▶ TYPE 8 : General Properties & Uses

Q41. Which of the following is/are correct statements?

- (1) $\text{K}_2\text{Cr}_2\text{O}_7$ has orange colour due to charge transfer
(2) Zn, Cd and Hg are not considered as transition metals
(3) Tungsten has a very high melting point
(4) All of these

Q42. Which of the statements is not true?

[AIPMT (Prelims)-2012]

- (1) $\text{K}_2\text{Cr}_2\text{O}_7$ solution in acidic medium is orange
(2) $\text{K}_2\text{Cr}_2\text{O}_7$ solution becomes yellow on increasing the pH beyond 7
(3) On passing H_2S through acidified $\text{K}_2\text{Cr}_2\text{O}_7$ solution, a milky colour is observed
(4) $\text{Na}_2\text{Cr}_2\text{O}_7$ is preferred over $\text{K}_2\text{Cr}_2\text{O}_7$ in volumetric analysis

Q43. How many statements are wrong.

- (A) Cr^{+3} is green in colour
(B) MnO_4^- is a strong O.A.
(C) The number of *d*-electrons in Fe^{2+} is 6.
(D) Zn^{2+} is colourless

- (1) 0 (2) 1 (3) 3 (4) 2

Q44. Where is potassium dichromate used?

- (1) In leather industry (3) As germicide cotton cloths
(2) In textile industry (4) As bleaching agent in

Q45. Which of the following is a use of potassium dichromate?

- (1) To oxidise ferrous ions into ferric ions in acidic medium as an oxidizing agent

- (2) As an insecticide
- (3) In electroplating
- (4) As a reducing agent