



श्री सत्य साई महिला महाविद्यालय, भोपाल
Sri Sathya Sai College for Women, Bhopal
An Autonomous College affiliated to Barkatullah University, Bhopal
NAAC द्वारा 'ए' ग्रेड प्राप्त / Accredited 'A' Grade by NAAC

CCE

क्रमांक / S.No.

06668

सतत मूल्यांकन उत्तर पुस्तिका / CCE ANSWER BOOK

Dimple Khatriwar

परीक्षा का नाम

Name of Examination BSC 2nd year Chemistry CCE IV

अनुक्रमांक अंकों में (Roll No. in figures)

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विषय

Subject Chemistry (minor) प्रश्न-पत्र Paper CCE-IV

अनुक्रमांक (शब्दों में)

Roll No. (in words) Two one two two one

दिनांक

Date 6/02/23 दिन Day Monday

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संलग्न पूरक उत्तर पुस्तिकाओं की संख्या

No. of Supplementary Answer Books

नामांकन क्रमांक (Enrollment No.)

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प्राप्ति (अंकों में)
Marks Obtained
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Long Answer Type

Q3. Valence Bond Theory (VBT) was given by L. Pauling and Slater.
Postulates of VBT are -

1. Central metal ion should have empty orbitals to accept lone pairs from ligands.
2. Metal - ligand bond is stronger due to overlapping in metal ion orbitals.
3. No. of hybrid orbitals is equal to the central metal orbitals participating in hybridization.
4. The metal d orbitals of metal ion can be inner orbital complex or outer orbital complex.

5. The non-bonding electrons present in the inner orbitals of metal ions do not participate in complex formation.

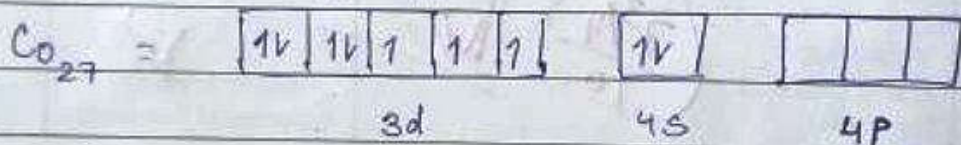
VBT in Octahedral Complex

⇒ Example - $[\text{Co}(\text{NH}_3)_6]^{3+}$

The structure of Co by VBT can be expressed as:

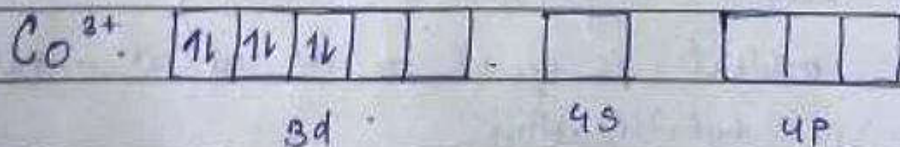
Electronic configuration of Co = $1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 3d^7, 4s^2, 4p^0$

Co - $3d^7 4s^2 4p^0$

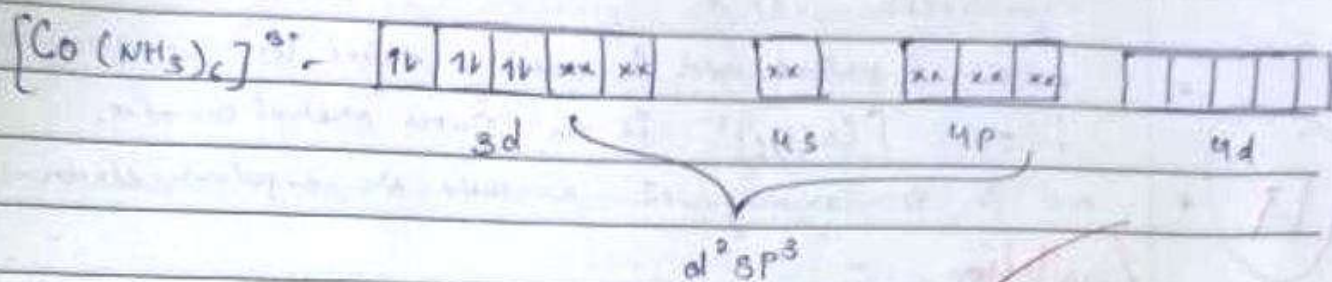


6x atoms of NH₃ will donate 6 lone pairs to Co. Co should have 6x empty orbitals to accept lone pair e⁻ from NH₃.

As NH₃ is a strong ~~lig~~ ligand pairing occurs.



The e⁻ pairs of NH₃ are represented by (xx)



The e^- pairs of NH_3 are occupied by 2 two d orbitals, one s orbital and one p orbital.

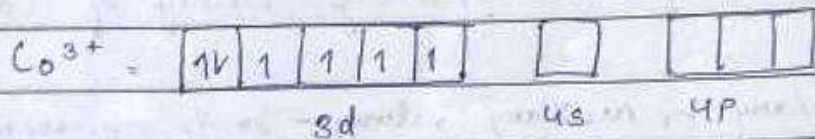
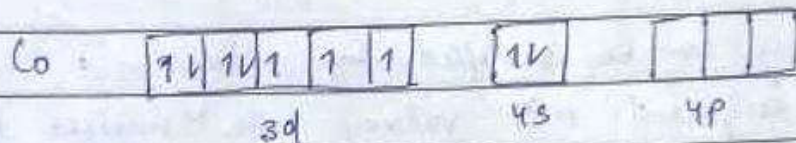
Hybridization = d^2sp^3

As the d-orbital used is inner orbital to the complex is an inner orbital complex.

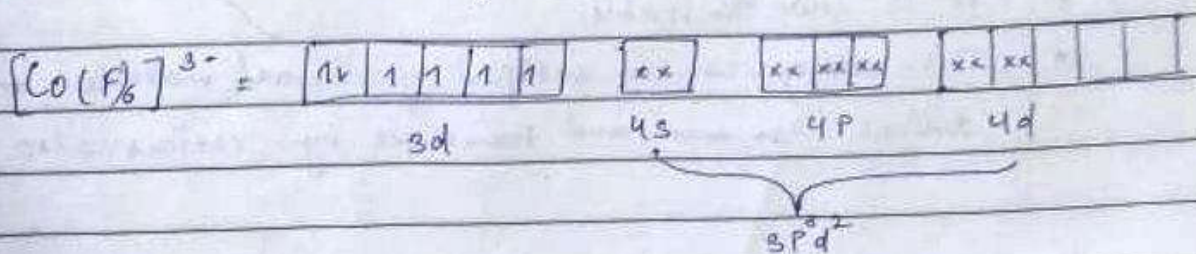
And the complex is Diamagnetic as there is no unpaired e^- .

⇒ Example - $[Co(F)_6]^{3-}$ - An example of outer orbital complex

Co electronic configuration = $[Ar] 3d^7 4s^2 4p^0$



As F^- is a weak ligand pairing will not occur



Hybridization - sp^3d^2

- * As the d-orbital used is outer d-orbital, so the complex $[CoF_6]^{3-}$ is an Outer orbital complex.
- * and it is Paramagnetic as there are unpaired electrons.

Limitation

Short Answer type

Q1. Werner's theory

This theory was given by Werner in relation to structure of complex

Postulates of Werner's theory -

1. Every metal has possess two valencies :

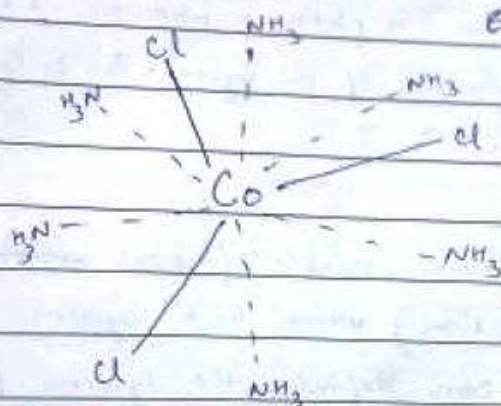
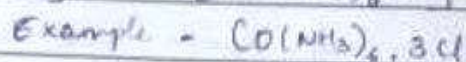
a) Primary or Principal Valency - It is represented by the oxidation states of metal ions. It is

- It is ionizable
 - This valency can be satisfied by anions
 - Werner designated this valency with straight line (—)
- Eg - $CoCl_3$ the primary valency of Co is 3.

b) Secondary or Auxiliary valency - It is represented by the coordination number present inside the coordination sphere.

- It is non ionizable
- This valency can be satisfied by neutral molecules, anions or even and sometimes by cations also.

- Werner designated this valency with dashed line (---)
eg - $[\text{Co}(\text{F})_6]^{3-}$ - the secondary valency of Co is 6



Primary valency (—) = 3

Secondary valency (---) = 6

12

② - ?

limitation

Q2. Phase rule: $F + P = C + 2$ ✓

Phase: Phase is a homogeneous part of a system which can be separated from other part by physical boundaries.

It is denoted by P

Eg - * A liquid solution have only 1 phase ✓

* A solid solution have only 1 phase

Component: The min lowest number of constituents interchangeable constituents in a system which can describe of composition of each phase and which can be expressed by chemical equation, is known as component. It is denoted by C. ✓

Eg - * In a water system, there are 3 phases (Ice, water and vapour) but the ingredient of the system is only water (H_2O) so the component is 1.

* In Sulphur system, there are 4 phases - rhombic, monoclinic, liquid & vapour but the constituent of the system is only Sulphur so the component (C) is 1.

Degree of Freedom: The minimum variable factors (temperature, pressure, concentration) which in a system which when kept arbitrarily fixed can define the system is known as degree of Freedom.

It is denoted by (F).

Example - * In a system if there is only one phase solid (Ice), or liquid or gas, then the factors pressure or concentration can be fixed then degree of freedom will be 1. The system will be univariant.

* If there is solid phase and liquid phase in a system, then any one factor cannot be fixed so, the degree of freedom will be 0. The system will be non-variant.



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one four zero one two.

परीक्षा का नाम
 Name of Examination

CCE - 4 (B.Sc I year)

विषय
 Subject

Chemistry

प्रश्न-पत्र
 Paper

Elective

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नामांकन क्रमांक (Enrollment No.)

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प्राप्त अंकों में
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 (in figures)

प्राप्त अंकों (शब्दों में)
 Marks Obtained
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- Ans. of Ques. 1 -

→ Chromatography can be classified as :-

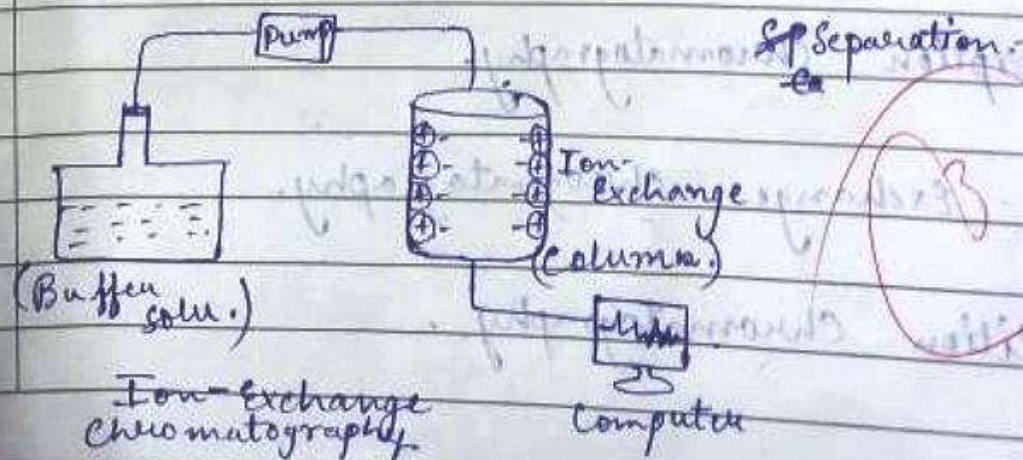
1. Gas chromatography.
2. Adsorption Chromatography.
3. Ion-Exchange chromatography.
4. Partition Chromatography.

1. Gas chromatography - In this type of chromatography, components are vaporized with heat decomposition. It can be gas-gas, gas-liquid.

2. Adsorption chromatography:- In this type of chromatography, components are separated with the help of surface.

3. Ion-exchange chromatography:- In this type of chromatography, the cation & anion attract the oppositely charged particle, and by this components are separated.

4. Partition chromatography:- In this type, the components are separated in partition with the help of aluminium & silica gel.



— Ans. of Ques. no. 2 —

→ 1. Accuracy :- The fraction balance between the fraction of values of true value and observed value of component in an experiment is known as Accuracy.

We can say that, when the true value and measured value are very close to each other, then value is accurate.

2. Precision :- When an experiment is performed several times by a same procedure, then the difference between their results are known as Precision.

— Ans. of Ques. no. 3 —

→ Concentration can be expressed in following ways :-

1. Molarity

2. Molality

3. Normality Normality.

1. Molarity :- (i) No. of moles of solute dissolved in one litre of solution is known as Molarity of that solution.

(ii) It is denoted by M.

(iii) In this solution is considered in 1 litre or 1000 ml. $M = \frac{\text{No. of solute}}{\text{Weight of solution} \times 1000}$

2. Molality :-

(i) No. of moles of solute dissolved in one kilogram of solution is known as Molality of that solution.

(ii) It is denoted by m.

(iii) In this solution is considered in 1 kg or 1000 gm.

3. Normality :-

(i) No. of gram equivalent solute dissolved in one litre of solution is known as Normality of that solution.

(ii) It is denoted by N.

(iii) N =

3 M