28. Chemistry of transition elements

Starter Quiz · 课前小测

A-Level Chemistry Name: _____ Score: _____

1. A transition element is a d-block element that:

   ☐ forms one or more stable ions with incomplete d orbitals

   ☐ has a full d sub-shell in all its ions

   ☐ is in the s-block

   ☐ never forms ions

2. A ligand bonds to a metal ion by:

   ☐ donating a lone pair in a dative covalent bond

   ☐ transferring an electron

   ☐ sharing one electron each

   ☐ forming an ionic bond

3. Ligand exchange is when:

   ☐ one ligand replaces another on the metal ion (often a colour change)

   ☐ the metal ion changes oxidation state

   ☐ electrons are transferred

   ☐ the complex is destroyed

4. In a free transition-metal ion, the five d orbitals are:

   ☐ degenerate (the same energy)

   ☐ all different energies

   ☐ split into two sets

   ☐ empty

5. Geometrical (cis/trans) isomerism in $[Pt(NH_3)_2Cl_2]$ means the two identical ligands are:

   ☐ adjacent (cis) or opposite (trans)

   ☐ always opposite

   ☐ mirror images

   ☐ removed

6. Transition-metal complexes can show both geometrical and optical isomerism.

   ☐ True ☐ False

7. The equilibrium constant for the formation of a complex from its aqua ion is the _____ constant.

   _____

8. A transition element forms at least one ion with an incomplete _____ subshell.

   _____

9. A molecule or ion that donates a lone pair to a central metal ion is a _____.

   _____

10. In ligand exchange, one ligand is replaced by another around the central metal ion.

    ☐ True ☐ False

A-Level Chemistry

1. **forms one or more stable ions with incomplete d orbitals**

   The incomplete d orbitals (in a stable ion) define a transition element.

2. **donating a lone pair in a dative covalent bond**

   A ligand donates a lone pair to the metal's vacant orbital — a dative (coordinate) bond.

3. **one ligand replaces another on the metal ion (often a colour change)**

   Swapping a ligand for another changes the complex and usually its colour.

4. **degenerate (the same energy)**

   They are degenerate until ligands approach and split them into two sets.

5. **adjacent (cis) or opposite (trans)**

   In a square planar complex the matching ligands sit next to each other (cis) or across (trans).

6. **True**

   Square planar/octahedral complexes show cis/trans; octahedral ones with bidentate ligands show optical isomerism.

7. **stability**

   A larger value means a more stable complex.

8. **d**

   This gives variable oxidation states and colour.

9. **ligand**

   It forms a coordinate bond to the metal.

10. **True**

    It can change the complex's colour.