

CHEM 11 AP - REDOX QUESTIONS

EXERCISES:

3. Calculate the oxidation number of the atom in **bold type**.

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|--|---|---|---|------------------------------------|
| a) HNO ₃ | e) N H ₄ ⁺ | i) Al (OH) ₄ ⁻ | m) HClO ₃ | q) K ₂ UO ₄ |
| b) N O ₂ ⁻ | f) N ₃ ⁻ | j) S ₂ F ₁₀ | n) N ₂ H ₅ ⁺ | r) C ₃ H ₆ O |
| c) Cr O ₄ ²⁻ | g) C ₂ H ₆ | k) N ₂ O ₃ | o) NH ₂ OH | s) S ₈ |
| d) Cr ₂ O ₇ ²⁻ | h) C ₃ H ₈ | l) HClO ₄ | p) C ₂ O ₄ ²⁻ | t) C ₄ H ₆ |

4. Assign oxidation numbers to the **bold** species in each of the following unbalanced reaction equations. Then determine which species undergoes oxidation in each reaction.

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| a) Cl O ₂ + C → Cl O ₂ ⁻ + C O ₃ ²⁻ | c) Mn O ₄ ⁻ + C ₂ O ₄ ²⁻ → Mn O ₂ + C O ₂ |
| b) Sn ²⁺ + Cl ⁻ + Br O ₃ ⁻ → Sn Cl ₆ ²⁻ + Br ⁻ | d) N O ₃ ⁻ + H ₂ Te → N O + Te O ₄ ²⁻ |

5. Which of the following are redox reactions?

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| a) I ₂ + 5 HOBr + H ₂ O → 2 IO ₃ ⁻ + 5 Br ⁻ + 7 H ⁺ | d) 2 H ₂ O → 2 H ₂ + O ₂ |
| b) 4 Ag ⁺ + Cr ₂ O ₇ ²⁻ + H ₂ O → 2 Ag ₂ CrO ₄ + 2 H ⁺ | e) H ₂ SO ₄ + BaCl ₂ → BaSO ₄ + 2 HCl |
| c) KHCO ₃ + HI → KI + CO ₂ + H ₂ O | f) Fe + H ₂ SO ₄ → FeSO ₄ + H ₂ |

19. Balance the following half-reactions.

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| a) Ce ⁴⁺ ⇌ Ce ²⁺ | h) N ₂ H ₄ ⇌ N ₂ (basic solution) |
| b) I ₂ ⇌ I ⁻ | i) HO ₂ ⁻ ⇌ O ₂ (basic solution) |
| c) Mn ²⁺ ⇌ MnO ₂ (acidic solution) | j) HXeO ₄ ⁻ ⇌ HXeO ₆ ³⁻ (basic solution) |
| d) O ₂ ⇌ H ₂ O ₂ (acidic solution) | k) HC ₂ H ₃ O ₂ ⇌ C ₂ H ₅ OH (acidic solution) |
| e) S ₂ O ₈ ²⁻ ⇌ HSO ₄ ⁻ (acidic solution) | l) Cr(OH) ₃ ⇌ CrO ₄ ²⁻ (basic solution) |
| f) H ₃ AsO ₄ ⇌ HAsO ₂ (acidic solution) | m) CH ₃ CHO ⇌ CH ₂ CH ₂ (acidic solution) |
| g) H ₂ SeO ₃ ⇌ Se (acidic solution) | |

24. Balance the following redox equations.

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| a) U ⁴⁺ + MnO ₄ ⁻ → Mn ²⁺ + UO ₂ ²⁺ (acidic) | m) Mn ²⁺ + HBiO ₃ → Bi ³⁺ + MnO ₄ ⁻ (acidic) |
| b) Zn + As ₂ O ₃ → AsH ₃ + Zn ²⁺ (acidic) | n) H ₂ O ₂ + Cr(OH) ₄ ⁻ → CrO ₄ ²⁻ (basic) |
| c) Fe ²⁺ + Cr ₂ O ₇ ²⁻ → Cr ³⁺ + Fe ³⁺ (acidic) | o) Sb ₂ S ₃ + NO ₃ ⁻ → NO ₂ + SO ₄ ²⁻ + Sb ₂ O ₅ (acidic) |
| d) Cl ₂ + SO ₂ → Cl ⁻ + SO ₄ ²⁻ (acidic) | p) As ₂ S ₃ + NO ₃ ⁻ → NO + SO ₄ ²⁻ + H ₃ AsO ₄ (acidic) |
| e) Cu + NO ₃ ⁻ → Cu ²⁺ + NO (acidic) | q) FeS + NO ₃ ⁻ → NO + SO ₄ ²⁻ + Fe ³⁺ (acidic) |
| f) S ²⁻ + ClO ₃ ⁻ → Cl ⁻ + S (basic) | r) FeHPO ₃ + Cr ₂ O ₇ ²⁻ → Cr ³⁺ + H ₃ PO ₄ + Fe ³⁺ (acidic) |
| g) OCl ⁻ → Cl ⁻ + ClO ₃ ⁻ (basic) | s) SnS ₂ O ₃ + MnO ₄ ⁻ → Mn ²⁺ + SO ₄ ²⁻ + Sn ⁴⁺ (acidic) |
| h) CN ⁻ + IO ₃ ⁻ → I ⁻ + CNO ⁻ (basic) | t) CuS + HNO ₃ → Cu(NO ₃) ₂ + NO ₂ + SO ₂ |
| i) Sn ²⁺ + H ₂ O ₂ → Sn ⁴⁺ (basic) | u) Ca ₃ (PO ₄) ₂ + SiO ₂ + C → P ₄ + CaSiO ₃ + CO |
| j) Br ₂ → Br ⁻ + BrO ₃ ⁻ (basic) | v) KMnO ₄ + H ₂ S + H ₂ SO ₄ → K ₂ SO ₄ + MnSO ₄ + S |
| k) HSO ₃ ⁻ + IO ₃ ⁻ → I ₂ + SO ₄ ²⁻ (acidic) | w) CuF ₂ + NH ₃ → Cu ₃ N + NH ₄ F + N ₂ |
| l) HNO ₂ → HNO ₃ + NO | |