

Practice Worksheet — Grade 12 Chemistry

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Enthalpy change calculations

1. In an exothermic reaction, what is true of the enthalpy change?
 - a) ΔH is positive because energy is released to the surroundings
 - b) ΔH is zero because energy is conserved
 - c) ΔH is negative because energy is released to the surroundings
 - d) ΔH is negative because energy is absorbed from the surroundings
2. How much heat is absorbed when 100.0 g of water is warmed by 25.0 °C? Use $c = 4.19 \text{ J/(g}\cdot\text{°C)}$.

Answer: _____ (J)
3. The molar enthalpy of combustion of methane is -890 kJ/mol . How much energy is released when 2.00 mol of methane burns? Give the magnitude in kJ.

Answer: _____ (kJ)
4. Using standard enthalpies of formation, calculate ΔH for $\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$. Use ΔH_f : $\text{CH}_4 = -74.6$, $\text{CO}_2 = -393.5$, $\text{H}_2\text{O} = -241.8$, $\text{O}_2 = 0 \text{ kJ/mol}$.

Answer: _____ (kJ)
5. What does a catalyst do to a reaction?
 - a) it increases the energy of the products
 - b) it lowers the enthalpy change of the reaction
 - c) it lowers the activation energy without changing ΔH
 - d) it is consumed during the reaction

Functional groups and isomers

6. What is the general formula for an alkane?
 - a) C_nH_n
 - b) C_nH_{2n}
 - c) $\text{C}_n\text{H}_{2n+2}$
 - d) $\text{C}_n\text{H}_{2n-2}$
7. How many carbon atoms are in a molecule of pentane?

Answer: _____ (carbons)

8. Which functional group defines an alcohol?
- a) -NH_2 , the amino group
 - b) -CHO , the aldehyde group
 - c) -COOH , the carboxyl group
 - d) -OH , the hydroxyl group
9. What distinguishes an unsaturated hydrocarbon from a saturated one?
- a) it always forms a closed ring structure
 - b) it contains at least one double or triple carbon-carbon bond
 - c) it contains an oxygen atom in the carbon chain
 - d) it contains only single carbon-carbon bonds throughout
10. In an addition reaction, what happens across a carbon-carbon double bond?
- a) the molecule splits into two smaller molecules
 - b) the double bond breaks and two new groups attach to the carbons
 - c) one group replaces a hydrogen already present
 - d) two hydrogen atoms are removed to make a triple bond

Le chatelier and K_c

11. What is true of a system at dynamic equilibrium?
- a) only the forward reaction is still occurring
 - b) the forward and reverse reactions continue at equal rates
 - c) both reactions have stopped completely
 - d) the concentrations of reactants and products are equal
12. For $\text{A} + \text{B} \rightleftharpoons 2\text{C}$ at equilibrium, $[\text{A}] = 0.20$, $[\text{B}] = 0.40$ and $[\text{C}] = 0.60 \text{ mol/L}$. What is K_c ?
- Answer: _____
13. A reaction at equilibrium is compressed into a smaller volume. According to Le Chatelier's principle, the system will shift towards which side?
- a) the side with fewer moles of gas
 - b) the side with the greater mass
 - c) it will not shift at all
 - d) the side with more moles of gas
14. What does a very large value of K_c tell you about a reaction?
- a) the reaction is exothermic
 - b) the reactants are strongly favoured at equilibrium
 - c) the reaction reaches equilibrium very quickly
 - d) the products are strongly favoured at equilibrium

15. According to Brønsted–Lowry theory, what is an acid?

- a) a proton donor
- b) a proton acceptor
- c) any substance containing hydrogen
- d) an electron pair donor

Redox and cell potential

16. What happens to a species that is oxidised?

- a) it loses electrons and its oxidation number decreases
- b) it gains protons and its charge decreases
- c) it loses electrons and its oxidation number increases
- d) it gains electrons and its oxidation number decreases

17. In an electrochemical cell, oxidation occurs at which electrode?

- a) the anode
- b) both electrodes equally
- c) the salt bridge
- d) the cathode

18. What is the oxidation number of sulfur in the sulfate ion, SO_4^{2-} ?

Answer: _____

19. What is the oxidation number of chromium in the dichromate ion, $\text{Cr}_2\text{O}_7^{2-}$?

Answer: _____

20. What is the purpose of a salt bridge in a galvanic cell?

- a) it supplies the energy that drives the reaction
- b) it carries electrons from the anode to the cathode
- c) it prevents any movement of charge between the two half-cells
- d) it keeps the cells neutral by letting ions move between them