



# The Rate and Extent of Chemical Change

## Multiple Choice Questions

### Set 5 (HT)

Tick **one** box.

**Equation 1** shows the reaction between sodium thiosulfate and hydrochloric acid.

#### Equation 1



When the reactants are mixed in a flask, the reaction mixture becomes turbid (cloudy).

1. Which product is responsible for the increased turbidity of the mixture?

- A. NaCl
- B. H<sub>2</sub>O
- C. SO<sub>2</sub>
- D. S

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A student investigated how the concentration of hydrochloric acid affected the rate of reaction of **Equation 1**. They timed how long it took the reaction mixture to obscure an 'X' on a piece of paper placed beneath the flask. Their results are shown in **Table 1**.

**Table 1**

Hydrochloric Acid Sample	Time Taken for 'X' to be Obscured (s)
W	34
X	63
Y	48
Z	15

2. Which sample of hydrochloric acid had the highest concentration?

- A. W
- B. X
- C. Y
- D. Z

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Over many years, copper objects change from being a shiny, orange-pink colour to a dull, green-blue colour. This change in appearance is due to an oxidation reaction.

3. Why does this reaction take place over many years?

- A. the pressure on copper objects increases over time
- B. the reactants were not all available until recently
- C. the reaction has a very high activation energy
- D. the reaction only occurs on hot days

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4. How does the size of the particles in a solid affect its rate of reaction?

- A. larger particles have a greater surface area to volume ratio which increases the rate of reaction
- B. larger particles have a smaller surface area to volume ratio which increases the rate of reaction
- C. smaller particles have a greater surface area to volume ratio which increases the rate of reaction
- D. smaller particles have a smaller surface area to volume ratio which increases the rate of reaction

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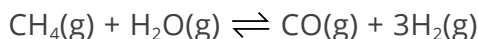
5. What does Le Chatelier's Principle describe?

- A. a system at equilibrium responds to counteract any changes made to it
- B. catalysts increase the rate of a reaction by lowering the activation energy
- C. particles will only react if they collide with enough energy
- D. reversible reactions are exothermic in one direction and endothermic in the opposite direction

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**Equation 2** shows how hydrogen gas can be obtained by reacting methane with steam. This reaction is endothermic in the forward direction and will reach equilibrium in a closed system.

**Equation 2**



6. What effect would increasing the temperature have on the rate of the forward reaction in **Equation 2**?

- A. the rate would decrease
- B. the rate would increase
- C. the rate would stay the same
- D. it is not possible to predict the effect on the rate

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7. What effect would increasing the temperature have on the yield of hydrogen in **Equation 2**?
- A. the yield would decrease ☐
  - B. the yield would increase ☐
  - C. the yield would stay the same ☐
  - D. it is not possible to predict the effect on the yield ☐
8. What effect would increasing the pressure have on the rate of the forward reaction in **Equation 2**?
- A. the rate would decrease ☐
  - B. the rate would increase ☐
  - C. the rate would stay the same ☐
  - D. it is not possible to predict the effect on the rate ☐
9. What effect would increasing the pressure have on the yield of hydrogen in **Equation 2**?
- A. the yield would decrease ☐
  - B. the yield would increase ☐
  - C. the yield would stay the same ☐
  - D. it is not possible to predict the effect on the yield ☐
10. What effect would using a catalyst have on the rate of the reaction in **Equation 2**?
- A. the rate would decrease ☐
  - B. the rate would increase ☐
  - C. the rate would stay the same ☐
  - D. it is not possible to predict the effect on the rate ☐