

Practice Problems

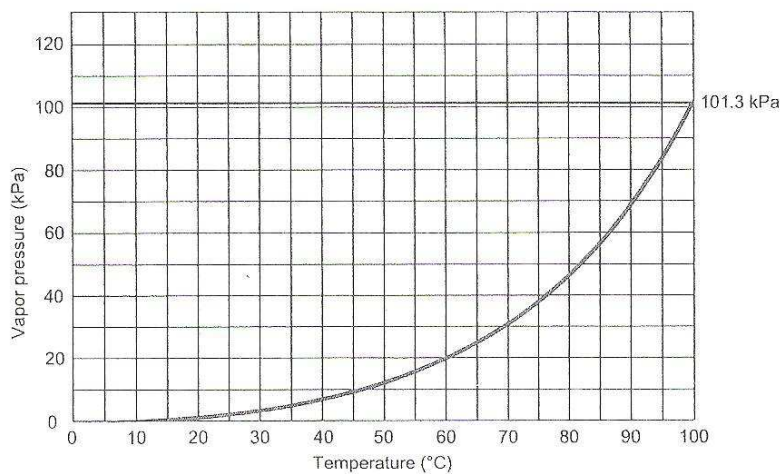
1. Write the equilibrium expression for the oxidation of hydrogen to form water vapor.
 $2\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{H}_2\text{O}(\text{g})$
2. Write the equilibrium expression for the formation of nitrosyl bromide.
 $2\text{NO}(\text{g}) + \text{Br}_2(\text{g}) \rightleftharpoons 2\text{NOBr}(\text{g})$
3. Write the equilibrium expression for the following reaction.
 $\text{NO}(\text{g}) + \text{O}_3(\text{g}) \rightleftharpoons \text{O}_2(\text{g}) + \text{NO}_2(\text{g})$
4. Write the equilibrium expression for the following reaction.
 $\text{CH}_4(\text{g}) + \text{Cl}_2(\text{g}) \rightleftharpoons \text{CH}_3\text{Cl}(\text{g}) + \text{HCl}(\text{g})$
5. Write the equilibrium expression for the following reaction.
 $\text{CH}_4(\text{g}) + \text{H}_2\text{O}(\text{g}) \rightleftharpoons \text{CO}(\text{g}) + 3\text{H}_2(\text{g})$
6. Write the equilibrium expression for the following reaction.
 $\text{CO}(\text{g}) + 2\text{H}_2(\text{g}) \rightleftharpoons \text{CH}_3\text{OH}(\text{g})$
7. Write the equilibrium expression for the combustion of ethane at high temperature.
 $2\text{C}_2\text{H}_6(\text{g}) + 7\text{O}_2(\text{g}) \rightleftharpoons 4\text{CO}_2(\text{g}) + 6\text{H}_2\text{O}(\text{g})$
8. Write the equilibrium expression for the decomposition of ethane.
 $\text{C}_2\text{H}_6(\text{g}) \rightleftharpoons \text{C}_2\text{H}_4(\text{g}) + \text{H}_2(\text{g})$
9. Write the equilibrium expression for the following reaction.
 $\text{Hg}(\text{g}) + \text{I}_2(\text{g}) \rightleftharpoons \text{HgI}_2(\text{g})$
10. Write the equilibrium expression for the following reaction.
 $\text{SnO}_2(\text{s}) + 2\text{CO}(\text{g}) \rightleftharpoons \text{Sn}(\text{s}) + 2\text{CO}_2(\text{g})$
11. Write the equilibrium expression for the following reaction.
 $\text{C}(\text{s}) + \text{CO}_2(\text{g}) \rightleftharpoons 2\text{CO}(\text{g})$
12. Write the equilibrium expression for the following reaction.
 $\text{FeO}(\text{s}) + \text{CO}(\text{g}) \rightleftharpoons \text{Fe}(\text{s}) + \text{CO}_2(\text{g})$
13. Write the equilibrium expression for the following reaction.
 $\text{KCl}(\text{l}) + \text{Na}(\text{l}) \rightleftharpoons \text{NaCl}(\text{l}) + \text{K}(\text{g})$
14. Write the equilibrium expression for the following reaction.
 $\text{NaCl}(\text{s}) + \text{H}_2\text{SO}_4(\text{l}) \rightleftharpoons \text{HCl}(\text{g}) + \text{NaHSO}_4(\text{s})$
15. Write the equilibrium expression for the following reaction.
 $\text{P}_4(\text{s}) + 6\text{NO}(\text{g}) \rightleftharpoons \text{P}_4\text{O}_6(\text{s}) + 3\text{N}_2(\text{g})$
16. Write the equilibrium expression for the following reaction.
 $2\text{NO}(\text{g}) + 2\text{H}_2(\text{g}) \rightleftharpoons \text{N}_2(\text{g}) + 2\text{H}_2\text{O}(\text{l})$

RETEACHINGINTERPRETING VAPOR PRESSURE GRAPHS

The normal boiling point of a liquid is the temperature at which the vapor pressure of the liquid is equal to standard atmospheric pressure, or 101.325 kPa. As the atmospheric pressure on a liquid decreases, the boiling point of the liquid also decreases. Therefore, boiling point is a

function of atmospheric pressure.

The graph shows the vapor pressure of water. On this graph, temperature is plotted along the *x*, or horizontal, axis. Pressure, in kPa, is plotted along the *y*, or vertical, axis. Use the graph to answer the following questions.



1. What is the boiling point of water at standard atmospheric pressure?

2. At what temperature does water have a vapor pressure of 50 kPa?

3. At what temperature does water boil if the atmospheric pressure is 90 kPa?

4. What is the vapor pressure of water at 50°C?

5. What is the vapor pressure of water at 60°C?

6. What happens to the vapor pressure of water as its temperature decreases?

7. What happens to the boiling point of water as atmospheric pressure increases?

8. Would the vapor pressure of water at 120°C be higher or lower than 101.325 kPa?
