**CHEMISTRY 2022-23 March 17, 2023**

**Today’s Agenda (Day 127)**

1. HOUSEKEEPING ITEMS

**🡪**  BRING:

1. Homework Check:

🡪LAUNCH LAB 16 – How Can You Accelerate a Reaction - Friday

🡪 Mini Lab 16 – Examine Reaction Rate and Temperature - Friday

🡪Chem Lab 15 – Measure Calories – Saturday

1. Class Activity:

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🡪DAY 4: Chapter 16 Reaction Rates

1. Section 16.4 – Instantaneous Reaction Rates and Reaction Mechanisms

HOMEWORK:

* READ: Chapter 16 – Reaction Rates
* COMPLETE:
* STUDY: Ch 16 Vocabulary Quiz and Test

CHAPTER 16 VOCABULARY

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| activated complex | activation energy | catalyst | collision theory | complex reaction | heterogeneous catalyst |
| homogeneous catalyst | inhibitor | instantaneous rate | intermediate | method of initial rates | rate law |
| rate-determining step | reaction mechanism | reaction order | reaction rate | specific rate constant |  |

REMINDERS:

* TEST: **Ch 16 🡪 March 21**

**CHEMISTRY 2022-23 LAUNCH LAB**

**CHAPTER 16 LAUNCH LAB – How Can You Accelerate a Reaction?**

Some chemical reactions go so slowly that nothing seems to be happening. In this lab, you can investigate one way of speeding up a slow reaction.

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**Procedure **

1. Read and complete the lab safety form.

2. Create a Before and After table to record your observations.

3. Pour about 10 mL of **hydrogen peroxide** into a **small beaker** or cup. Observe the hydrogen peroxide. Complete the Before column with your initial observations. WARNING: Hydrogen peroxide is corrosive. Avoid contact with skin and eyes.

4. Add 0.1 g of **baker’s yeast** to the hydrogen peroxide. Stir gently with a **toothpick** and observe the mixture again. Complete the After column with your observations.

**Analysis**

1. Identify the two products formed when hydrogen peroxide decomposes. 2. Explain why bubbles are produced in Step 4 but not in Step 3.

**Inquiry**

What would happen if you added more or less yeast? What if you did not stir the mixture? Design an experiment to test one of these variables?

**CHEMISTRY 2022-23 CHEM LAB**

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**CHEMISTRY 2022-23 MINI LAB**

**CHAPTER 16 MINI LAB – Examine Reaction Rate and Temperature**

What is the effect of temperature on a common chemical reaction?

**Procedure **

1. Read and complete the lab safety form.

2. Break a single **effervescent** **tablet** into four equal pieces.

3. Use a **balance** to measure the mass of one piece of the tablet. Measure 50 mL of room temperature **water** (approximately 20°C) into a **250-mL beaker**. Use a **nonmercury thermometer** to measure the temperature of the water.

4. With a **stopwatch** or a **clock with a second hand** ready, add the piece of tablet to the water. Record the amount of time elapsed between when the tablet hits the water and when all of the solid has dissolved.

5. Repeat Steps 3 and 4, this time gradually warming the 50 mL of water to about 50°C on a hot plate. Maintain the temperature (equilibrate) throughout the run.

**Analysis**

1. Identify the initial mass, the final mass, and t 1 and t 2 for each trial run.

2. Calculate the reaction rate by finding the mass of reactant consumed per second for each run.

3. Describe the relationship between reaction rate and temperature for this reaction.

4. Predict what the reaction rate would be if the reaction were carried out at 40°C and explain the basis for your prediction. To test your prediction, repeat the reaction at 40°C using another piece of tablet.

5. Evaluate how well your prediction for the reaction rate at 40°C compares to the measured reaction rate.

**CHEMISTRY 2022-23 PROBLEM-SOLVING LAB**

**CHAPTER 16 Problem Solving Lab – How Does the Rate of Decomposition Vary Over Time**

The compound dinitrogen pentoxide (N2O5) decomposes in air according to the equation

2 N2O5(g) → 4NO2(g) + O2(g)

Knowing the rate of decomposition allows its concentration to be determined at any time.

**Analysis**

The table shows the results of an experiment in which the concentration of N2O5, was measured over time at normal atmospheric pressure and a temperature of 45°C.

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**Think Critically**

1. Calculate the average reaction rate for each time interval: 0–20 min, 40–60 min, and 80–100 min. Express each rate as a positive number and in moles of N2O5 consumed per liter per minute.
2. Express the average reaction rate for each time interval in moles of NO2 produced per liter per minute. Use the reaction equation to explain the relationship between these rates and those calculated in Question 1.
3. Interpret the data and your calculations in describing how the average rate of decomposition of N2O5 varies over time.
4. Apply collision theory to infer why the reaction rate varies as it does.

**CHEMISTRY 2022-23 PRACTICE PROBLEM**

**CHAPTER 16 – Reaction Rates**

**Practice Problems 16.1 –** Calculate Average Reaction Rates

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**Practice Problems 16.2 –** Determining Reaction Order

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**Practice Problems 16.3 –** Calculate Instantaneous Reaction Rates

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**CHEMISTRY 2022-23 CHEM LAB**

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