**(AP) ENVIRONMENTAL SCIENCE 2022-23 October 11, 2022**

**Today’s Agenda (Day 33)**

1. Housekeeping Items

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1. Homework Check:

🡪 Chapter 4 Reading Guide

1. Class Activity:

🡪 DAY 1: Chapter 4 PPT Review

1. **Section 4.1 – The Nature of Science**
2. **Section 4.2 - Limitations of Science**
3. Section 4.3 – Pseudoscience
4. Section 4.4 – The Structure of Matter
5. Section 4.5 – Energy Principles
6. Section 4.6 – Environmental Implications of Energy Flow

HOMEWORK:

* READ: Chapter 4 – Interrelated Scientific Principles: Matter, Energy, and Environment
* COMPLETE: Chemistry Reinforcement – see p. 2 of document, Important Ions and Compounds
* **STUDY**: Chapter 4 Test, Chemicals and Symbols Quiz

IMPORTANT IONS

|  |  |  |  |
| --- | --- | --- | --- |
| **POSITIVE IONS** | **SYMBOL** | **NEGATIVE IONS** | **SYMBOL** |
| Hydrogen ion |  | Chloride ion |  |
| Sodium ion |  | Hydroxide ion |  |
| Calcium ion |  | Nitrate ion |  |
| Aluminum ion |  | Sulfate ion |  |
| Ammonium ion |  | Phosphate ion |  |

IMPORTANT COMPOUNDS

|  |  |  |  |
| --- | --- | --- | --- |
| **COMPOUND** | **FORMULA** | **COMPOUND** | **FORMULA** |
| Sodium chloride |  | Methane |  |
| Carbon monoxide |  | Glucose |  |
| Carbon dioxide |  | Water |  |
| Nitric oxide |  | Hydrogen sulfide |  |
| Nitrogen dioxide |  | Sulfur dioxide |  |
| Nitrous oxide |  | Sulfuric acid |  |
| Nitric acid |  | ammonia |  |

REMINDERS

* ~~Chapter 4 Reading Guide – Oct. 11~~
* Chemistry Reinforcement AND Important Ions & Compounds– Oct. 12
* **QUIZ:** **Chemicals and Symbols [elements, polyatomic ions, acids, and compounds] 🡪 Oct. 13**
* **TEST:** **Ch 4 🡪 Oct. 18**

**(AP) ENVIRONMENTAL SCIENCE 2022-23 CHEMISTRY REINFORCEMENT**

 **Chemicals and Symbols**

INSTRUCTIONS: Please complete the table below with the appropriate chemical symbols (and ionic charge) for each element, common polyatomic ion, AND acid listed.

ELEMENTS, IONIC CHARGES, AND SYMBOLS

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Hydrogen -  | Helium -  | Lithium -  | Beryllium -  | Boron - | Carbon - | Nitrogen - | Oxygen - | Fluorine - |
| Neon -  | Sodium -  | Magnesium - | Aluminum -  | Silicon - | Phosphorus- | Sulfur - | Chlorine - | Argon - |
| Potassium- | Calcium -  | Chromium -  | Manganese - | Iron - | Cobalt - | Nickel - | Copper - | Zinc - |
| Arsenic -  | Selenium -  | Bromine -  | Krypton -  | Palladium - | Silver - | Cadmium - | Tin - | Iodine - |
| Xenon -  | Cesium -  | Barium -  | Platinum -  | Gold - | Mercury - | Lead - | Radon - | Radium - |

COMMON POLYATOMIC IONS & ACIDS

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Ammonium | Carbonate | Cyanide | hydrogen carbonate / bicarbonate | hydrogen phosphate | hydrogen sulfate / bisulfate | Hydroxide | Nitrate | Nitrite |
| Peroxide | Phosphate | Sulfate | Sulfite | Acetic acid | Hydrochloric acid | Nitric acid | Phosphoric acid | Sulfuric acid |

**Important Ions & Compounds**

INSTRUCTIONS: Please complete the table below with the appropriate chemical symbols or molecular formulas for each ion AND compound listed below.

IMPORTANT IONS

|  |  |  |  |
| --- | --- | --- | --- |
| **POSITIVE IONS** | **SYMBOL** | **NEGATIVE IONS** | **SYMBOL** |
| Hydrogen ion |  | Chloride ion |  |
| Sodium ion |  | Hydroxide ion |  |
| Calcium ion |  | Nitrate ion |  |
| Aluminum ion |  | Sulfate ion |  |
| Ammonium ion |  | Phosphate ion |  |

IMPORTANT COMPOUNDS

|  |  |  |  |
| --- | --- | --- | --- |
| **COMPOUND** | **FORMULA** | **COMPOUND** | **FORMULA** |
| Sodium chloride |  | Methane |  |
| Carbon monoxide |  | Glucose |  |
| Carbon dioxide |  | Water |  |
| Nitric oxide |  | Hydrogen sulfide |  |
| Nitrogen dioxide |  | Sulfur dioxide |  |
| Nitrous oxide |  | Sulfuric acid |  |
| Nitric acid |  | ammonia |  |

**(AP) ENVIRONMENTAL SCIENCE 2022-23 READING GUIDE**

**CHAPTER 4**

REVIEW QUESTIONS

1. How do scientific disciplines differ from nonscientific disciplines?

2. What is a hypothesis? Why is it an important part of the way scientists think?

3. Why are events that happen only once difficult to analyze from a scientific point of view?

4. What is the scientific method, and what processes does it involve?

5. How are the second law of thermodynamics and pollution related?

6. Diagram an atom of oxygen and label its parts.

7. What happens to atoms during a chemical reaction?

8. State the first and second laws of thermodynamics.

9. How do solids, liquids, and gases differ from one another at the molecular level?

10. List five kinds of energy.

11. Are all kinds of energy equal in their capacity to bring about changes? Why or why not?

CRITICAL THINKING QUESTIONS [for APES students only]

1. You observe that a high percentage of frogs, which are especially sensitive to environmental poisons, in small ponds in your agricultural region have birth defects. Suspecting agricultural chemicals present in runoff to be the culprit, state the hypothesis in your own words. Next, devise an experiment that might help you support or reject your hypothesis.

2. Given the experiment you proposed in Critical Thinking Question 1, imagine some results that would support that hypothesis. Now imagine you are a different scientist, one who is very skeptical of the initial hypothesis. How convincing do you find these data? What other possible explanations (hypotheses) might there be to explain the results? Devise a different experiment to test this new hypothesis.

3. Increasingly, environmental issues such as global climate change are moving to the forefront of world concern. What role should science play in public policy decisions? How should we decide between competing scientific explanations about an environmental concern such as global climate change? What might be some of the criteria for deciding what is “good science” and what is “bad science”?

4. How important are the first and second laws of thermodynamics to explaining environmental issues? Using the concepts in these laws of thermodynamics, try to explain a particular environmental issue. How does an understanding of thermodynamics change your conceptual framework regarding this issue?

5. The text points out that incandescent lightbulbs are only 5–10 percent efficient at using energy to accomplish their task, while new, initially more expensive, compact fluorescent lighting uses significantly less electricity to provide the same quantity of light. Examine the contextual framework of those who advocate for new lighting methods and the contextual framework of those who continue to design and build using the old methods. What are the major differences in perspective? What could you suggest being done to help bring these different perspectives closer together?

6. Some scientists argue that living organisms constantly battle against the principles of the second law of thermodynamics using the principles of the first law of thermodynamics. What might they mean by this? Do you think this is accurate? What might be some of the implications of this for living organisms?