

## Review Chapters 18-25

### Test Notes

- Test will be available starting tomorrow (Tuesday)
- A periodic table will be provided on the test
- Vocabulary quiz is due 5:00 Friday
- Late fee starts Friday at 11:00am
- Absolute deadline is next Monday
- If you want to review further:
  - Monday: 6-8pm, 446 MARB
  - Tuesday: 6-8pm, 2107 JKHB
  - Wednesday: 4-6pm 1104 JKHB

### Chapter 18 – Law of Increasing Disorder

- Review
  - Types of Processes
    - Reversible
    - Irreversible
    - How do each of these affect disorder (entropy)?
  - Energy Forms
    - How much disorder is in each?
  - Conversion of Energy Forms
    - How does disorder play a part in this?
  - Implications for Society

Table 18.1 – Forms of Energy and Their Ranking in Terms of Organization

Gravitational Potential Energy and Macroscopic Kinetic Energy	↑ ordered
Nuclear Potential Energy	
Electrical (Household)	
Chemical Potential Energy	
Thermal Energy (also known as Heat or Microscopic Kinetic Energy)	↓ disordered

### In an irreversible process, the amount of disorder in the universe

- Is zero
- Becomes infinite
- Stays the same
- Decreases
- Increases

### A car burns gasoline and travels down the road.

- Explain
  - What forms of energy are present?
  - How are the energy forms changing?
  - What is happening to the total amount of energy?
  - What is happening to the total amount of entropy?



### Chapter 19 – Elements & Compounds

- Review
  - Difference between:
    - Element
    - Compound
    - Alloy
    - Mixture
    - Solution
  - Know the types of matter
    - Atomic
    - Molecular
    - Network
  - Structure of Molecules
    - Formulas
    - Shapes
  - Analytical Techniques
    - Mass Spectroscopy
    - IR Spectroscopy

Which of the following is a type of network matter?

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- A. Hydrogen gas
- B. Water
- C. Carbon dioxide
- D. Sodium Chloride
- E. Methane

Which of the following elements is most likely to form an alloy with gold (Au)?

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- A. Ag (Silver)
- B. Si (Silicon)
- C. O (Oxygen)
- D. F (Fluorine)
- E. B (Boron)

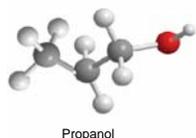


What would the formula be for propanol, the next member of this molecular family?

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- A. CH<sub>3</sub>OH
- B. C<sub>2</sub>H<sub>5</sub>OH
- C. C<sub>3</sub>H<sub>7</sub>OH
- D. C<sub>7</sub>H<sub>9</sub>OH



Chapter 20 – Chemical Reactivity

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- Review
  - Chemical Bonding
    - New orbitals
    - Importance of valence electrons
  - Balancing Equations
    - Conservation of Matter & Charge
  - Rates of Chemical Reactions
    - Activation Energy
    - Entropy
    - Catalysts
  - Chemical Equilibrium

A combination of Ca and Cl would result in which type of matter

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- a) Molecular
- b) Atomic
- c) Alloy
- d) Network Solid

Which of the following equations is balanced?

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- A.  $\text{CH}_4 + \text{O}_2 = \text{CO}_2 + \text{H}_2\text{O}$
- B.  $\text{CH}_4 + 2\text{O}_2 = \text{CO}_2 + 2\text{H}_2\text{O}$
- C.  $2\text{CH}_4 + \text{O}_2 = 2\text{CO}_2 + \text{H}_2\text{O}$
- D.  $\text{CH}_4 + \text{O}_2 = \text{CO}_2 + \text{H}_2$
- E.  $\text{CH}_4 + \text{O}_2 = \text{C}_2\text{H}_6 + \text{H}_2\text{O}$

## Chapter 21 – Bonding of Metals

- Review
  - Properties of Metals
  - What are the electron orbitals like?
    - Include huge numbers of atoms
    - Lots of energy levels (band)
    - Electrons free to move
  - How does this explain the properties of metals?
    - Opaque
    - Conductors of heat & electricity
    - Shiny, reflective
    - Chemically reactive
    - Malleable and Ductile
    - High Melting Temperature
    - Alloys
  - Semi-conductors
    - How are they different from metals

An LED made with a semi-conductor emits red light. If the LED is heated, however, the electron band gap decreases. How will this affect the color of the light emitted?

- A. Shift it to longer wavelength light
- B. Shift to shorter wavelength light
- C. No effect will be observed on the light emitted

## Chapter 22 – Ionic Bonding

- Review
  - Properties of Ionic Materials
  - Why does the bond form
    - Valence electrons
    - Electromagnetic attraction
  - Characteristics of Bond
    - Electrons localized near atoms
    - Not free to move
    - Few electron energy levels
  - How does this explain...
    - High melting and boiling T
    - Transparency
    - Brittleness
    - Electrical properties

How many electrons does nitrogen (N) have in its outermost s and p orbitals?

- A. 1
- B. 2
- C. 3
- D. 4
- E. 5

Which of the equations below for the ionic compound potassium oxide is balanced?

- A.  $K + O_2 = KO_2$
- B.  $K + O_2 = K_2O$
- C.  $4K + O_2 = 2K_2O$
- D.  $2K + O_2 = KO_2$

Compare and Contrast:  
Ionic Compounds vs Metals



- Network Solids
  - High melting T's
  - Brittle solids
  - Don't conduct heat and electricity in solid
  - Often colorless and usually transparent in big chunks (White when powdered)
- Network Solids
  - High melting T's
  - Malleable
  - Good conductors of heat and electricity in solid
  - Opaque

Which of the following will **not** be a property of potassium oxide?

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- A. High melting and boiling T
- B. White when powdered
- C. Conduct electricity when solid
- D. Dissolve in water
- E. Brittle

## Chapter 23 – Covalent Bonding

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- Review
  - Properties?
    - Melting and Boiling T's
    - Electrical conductivity?
  - How does a covalent bond form?
    - Sharing of valence electrons
  - Polar Bonds/Non-polar Bonds
    - Electronegativity
  - Polar & Non-polar Molecules
  - Types of Intermolecular forces
    - Dispersion
    - Dipole-dipole interactions
    - Hydrogen Bond
  - Covalent materials properties

Which of the following atoms would likely be the most electronegative?

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- A. C
- B. N
- C. O
- D. F

Which covalent materials dissolve most readily in water?

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- A. Those with strongly polar molecules
- B. Those with weakly polar molecules
- C. Those without polar molecules
- D. This property has nothing to do with the polar nature of the molecules

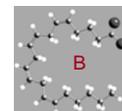
## Chapter 24 – It's All Chemistry

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- Review
  - Fatty Acids
    - Saturated Fats
    - Unsaturated Fats
    - Trans Fats
    - How do the molecule's shapes affect properties?
  - Silicate Minerals
    - What is the basic unit that forms these minerals?
    - How can it be put together?
    - How does the internal structure affect the external properties?

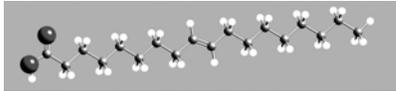
Which of the fatty acids shown would have the lowest melting temperature?

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The fatty acid shown below has one double bond between carbon atoms, but is not kinked. This would be classified as...?

- A. A saturated fatty acid
- B. A poly-unsaturated fatty acid
- C. A trans-fatty acid



## Chapter 25 – Nuclear Processes

- Review
  - Properties of the strong force
  - Nuclear Potential Energy
    - How does it relate to mass per nucleon?
    - How does an atom gain it or lose it?
  - Fusion
    - Which atoms are likely to fuse?
  - Fission
    - Which atoms are likely to fission?
    - Why?
  - Radioactive Decay
    - Why does it happen?

## Fission and Fusion

Is it Fission or Fusion:

- Which is a splitting apart?
- Which is a welding together?
- Which requires enormous temperatures (100,000,000 degrees Celsius)?
- Which uses isotopes of hydrogen?
- Which uses isotopes of uranium?
- Which can release energy explosively (bombs)?
- Which is presently used as a commercial source of energy?
- Which powers the sun?
- Which produces very long-lived (250,000 years) radioactive by-products?
- Electron-positron annihilation is classified as which?
- Which is the more easily controlled?
- Which promises the more plentiful, more easily obtained ingredients for fuel?

A sample of radioactive material with a half-life of 6 hours sits for a day (24 hrs). How much of the original material remains?

- a) A half
- b) A quarter
- c) An eighth
- d) A sixteenth