

Study Guide-Chemistry of Life for BIOLOGY

1. Define matter.
2. Describe the relationship between atom and element using examples.

An atom is the smallest unit of the element that still has the properties of that element. (You can't get any smaller and still have the characteristics of that element)

Example: if I had a gold ring, it is made of the element GOLD. It has GOLD atoms. If you were to chop a GOLD atom in half, it would no longer have the properties that we all know GOLD has!

4. Is an atom positive, negative, or neutral? _____

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Particle	Charge	Location
Proton		
		Orbiting outside nucleus
	Neutral	

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	Proton	Neutron	Electron
Gives identity to element	✓		
Always equals number of protons in a neutral atom.			✓
Changes in number in isotopes of the same element.		✓	
Changes in number when elements ionize.			✓
Determine chemical reactivity of an atom.			✓
The atomic number of an element is the number of this subatomic particle	✓		
The mass number is the addition of these two particles.	✓	✓	

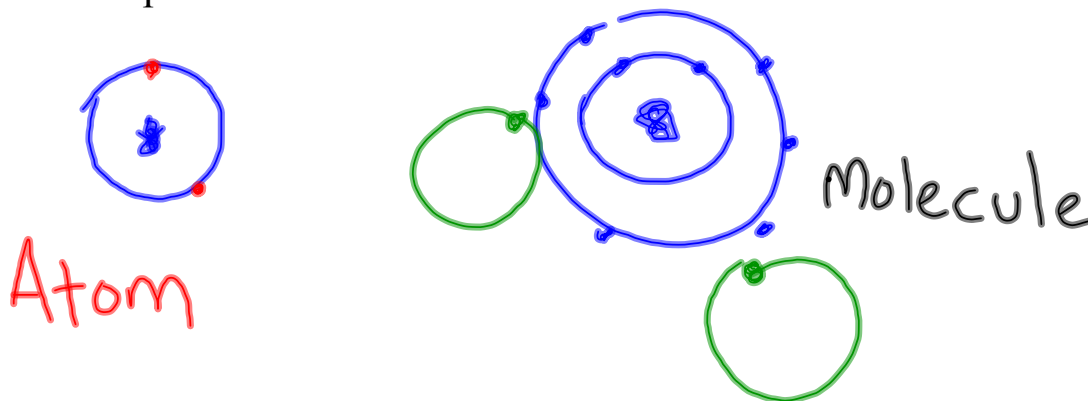
Na⁺

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6. What is the difference between an atom and an isotope?

7. Which particles are the same in isotopes of the same element. Which particles are different?

8. Explain the difference between atoms and molecule.



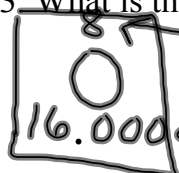
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9. Label the following as a molecule, ionic compound, ion, isotope, or atom.
- | | | | | | |
|---------------------|-----|-------------------|---|---------|----|
| a. H ₂ O | M | c. C | A | E. NaCl | IC |
| b. Na ⁺ | Ion | d. O ₂ | M | F. N | A |

11. How many valence electrons fit into the
- a. first energy level? 2
- b. second energy level? 8

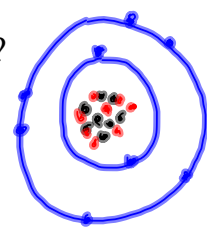
12. Be able to explain and draw atomic structure when given atomic number or a periodic table.

13. What is the difference between an ionic and covalent bond?



Atomic # = # of P.

mass = # P + N



electron

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15. Which is stronger, hydrogen bonds or ionic bonds?

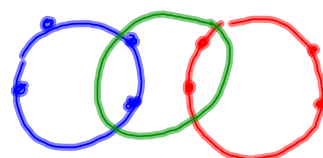
16. Why does water tend to hydrogen bond to other water molecules?



17. How many electrons are shared in a covalent single bond? 2

double bond? 4

triple bond? 6



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18. What is the difference between a non-polar and polar covalent bond?



non-polar molecule has no charges (the electrons are shared equally)

polar-molecule has slight charges at opposite ends (due to the unequal sharing of electrons)

19. Van der Waals and hydrogen bonding allow for cohesion and adhesion. What is the difference between cohesion and adhesion?

20. Explain the following properties of water. Give an example from lab or life.

- Cohesion: put drops of water onto penny, didn't fall off
- Adhesion: water molecules attracted to the penny molecules
- Surface tension: balance the paper clip on the surface of water

21. What is the difference between mixture and suspension?

Mixture: when two substances (such as H_2O and N_2) that are in the same container but NOT chemically combined with one another.

Suspension: is liquid mixture involving two substances where one is suspended in another.

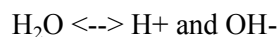
Similar to: a polar substance (like water) and a non-polar substance (like oil)

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22. In salt water, which is the solute and which is the solvent?

23. Is salt water an example of a mixture, a suspension, or a solution?

24. Water ionizes slightly to form two ions. Write them.



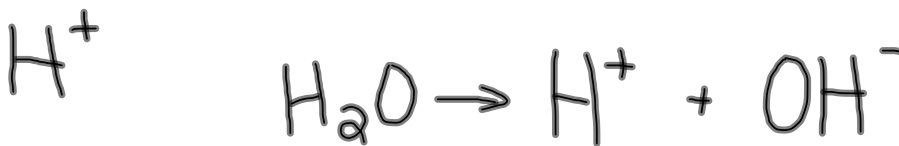
pH is a measure of the amount of H^+ in a solution

25. The number of these ions in a solution can be measured by using what kind of paper?

26. What is the range of the pH scale? 0-14

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	Acid	Neutral	Base
Relative number of hydrogen (hydronium) ions to hydroxide ions (<, > or =)	$H^+ > OH^-$	$H^+ = OH^-$	$H^+ < OH^-$
pH (< 7, > 7, or = 7)	pH < 7	pH = 7	pH > 7



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28. What number is considered neutral on the scale? **7** What does it mean to be neutral?

29. What are the ranges and ion concentration differences between acids and bases?

acids (0-6.99999) have more H^+ than OH^-
 Neutral (7) has equal numbers
 bases (above 7-14) have more OH^- than H^+

30. How many times more acidic is a three on the scale, than a four? **10**

a pH of 3 is 100 times more acidic than a pH of 5

31. Define buffer.

made of weak acid or weak base that prevents sharp pH changes from happening in the cell.

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32. What are the states of matter? Explain each in terms of volume and shape.

solid,

liquid,

gas: can spread through its container

33. Compare and contrast chemical reactions and physical changes.

physical change could be a phase change (ice melting) and does not result in changing the identity of the substances.

chemical change alters the identity of the substances--changing them into new substances.

Evidence of chemical changes includes:

a. color change

b. bubbles released

c. energy released

d. precipitate formed (chunky!)

34. Are changes in state chemical or physical changes? Explain why or why not.

physical change

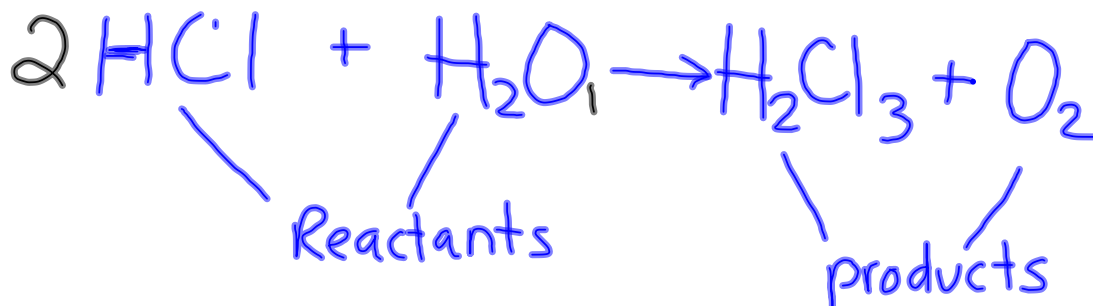
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36. Be able to look at a chemical equation and

a. Locate the products and reactants

b. Determine the number of molecules of a certain kind.

c. Determine the number of atoms of a certain kind



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38. What are the four types of macromolecules? List the monomers for each

- a. carbohydrate (monomer: monosaccharide such as glucose)
- b. lipids (no monomer)
- c. Protein (monomer: amino acids)
- d. nucleic acid (monomer: nucleotides)

↳ DNA, RNA

Pass on heredity (Traits)
Controls Cell

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39. What are the three types of lipids and what are lipids used for?

- a. fat
 - b. oil
 - c. wax
- energy storage

40. Explain the differences between saturated and unsaturated fats.

- a. saturated are solid at room temp; unsaturated are liquid
saturated do not have double bonds but unsaturated does

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1. What two things are carbohydrates used for?

Gives us energy

Can act as a structural support molecule (plants)

a. List two examples for each

energy:

in plants=starch

in animals=glycogen

structural support:

in plants: cellulose

in insects: chitin

b. What is the name for $C_6H_{12}O_6$? ____ (Glucose) ____ Is it a monomer or a polymer?

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44. Enzymes are made
of protein.
They speed up
chemical reactions.
Without them our reactions
would be too slow

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