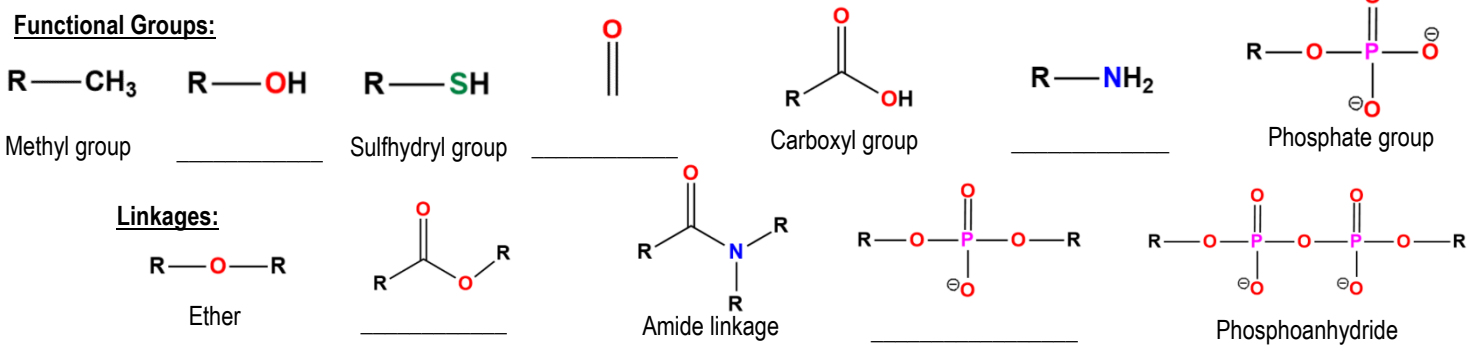


CONCEPT: FUNCTIONAL GROUPS

- Functional groups: portions of a molecule that are abundant in biomolecules & tend to be _____.
 - Typically extend off of the *carbon backbone* of a molecule.
- _____: particular bonding arrangements of atoms that can be used to link different kinds of molecules.

EXAMPLE: Label the functional groups & linkages below:

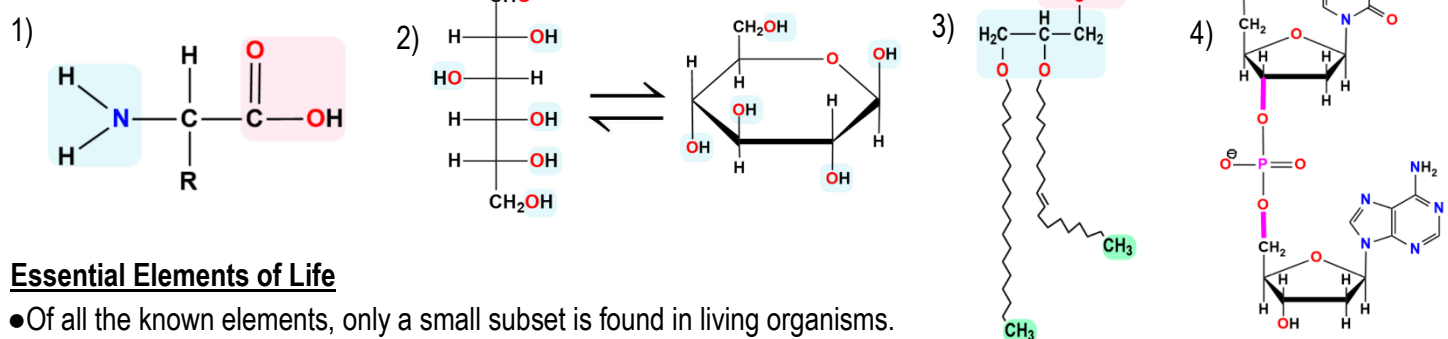
Functional Groups:



Functional Groups in Biomolecules

- Certain functional groups & linkages appear frequently in specific types of molecules.
 - 1) Amino acids & proteins have _____ groups & _____ groups.
 - 2) *Carbohydrates* tend to have an abundance of _____ groups and _____ linkages.
 - 3) *Lipids* vary greatly in structure, but *fatty acids* typically have _____ groups.
 - 4) Each nucleotide in a *nucleic acid* molecule has _____ linkages.

EXAMPLE:



Essential Elements of Life

- Of all the known elements, only a small subset is found in living organisms.
- ~97% of the mass of most life is composed of Carbon, Hydrogen, Nitrogen, Oxygen, Phosphorus & Sulfur (**CHNOPS**).
- 23 other elements called _____ elements appear in small amounts but are still required for life.

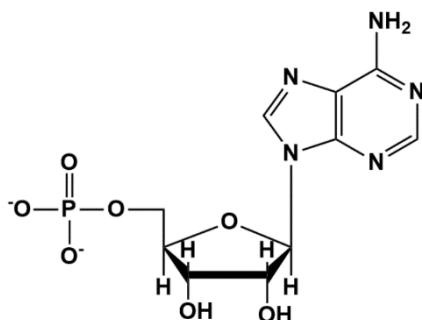
- Include 5 essential ions: Na⁺, Cl⁻, K⁺, Ca²⁺, Mg²⁺

EXAMPLE:

Periodic Table of Elements																		0	
																		1	2
																		H	He
																		3	4
																		Li	Be
																		6.941	9.012
																		11	12
																		Na	Mg
																		22.99	24.31
																		19	20
																		K	Ca
																		39.10	40.08
																		37	38
																		Rb	Sr
																		85.47	87.62
																		55	56
																		Cs	Ba
																		132.9	137.3
																		87	88
																		F	Ne
																		(223)	(229)
																		101	102
																		La	Ce
																		140.1	140.9
																		90+	91
																		Th	Pa
																		232.0	231
																		58*	59
																		Ce	Pr
																		140.1	140.9
																		60	61
																		Nd	Pm
																		144.2	(145)
																		62	63
																		Sm	Eu
																		150.4	152.0
																		64	65
																		Gd	Tb
																		157.3	158.9
																		66	67
																		Dy	Ho
																		162.5	164.9
																		68	69
																		Er	Tm
																		167.3	168.9
																		70	71
																		Yb	Lu
																		173.0	175.0
																		90+	91
																		Th	Pa
																		232.0	231
																		58*	59
																		Ce	Pr
																		140.1	140.9
																		60	61
																		Nd	Pm
																		144.2	(145)
																		62	63
																		Sm	Eu
																		150.4	152.0
																		64	65
																		Gd	Tb
																		157.3	158.9
																		66	67
																		Dy	Ho
																		162.5	164.9
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																		167.3	168.9
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																		Yb	Lu
																		173.0	175.0
																		90+	91
																		Th	Pa
																		232.0	231
																		58*	

CONCEPT: FUNCTIONAL GROUPS

PRACTICE: Identify and label the functional groups and linkages in the following molecule:



PRACTICE: Which of the following elements likely make up the largest portion of the mass in an organism?

- a) Phosphorus
- b) Sodium
- c) Magnesium
- d) Fluorine