Exercise 1: Atoms

Complete the table. You may need the periodic tables and the following information. **Assume all atoms are neutral in electrical charge**.

- 1 proton = 1 neutron = 1 amu
- 1 electron = 0 amu
- Atomic Number (AN) = P = E
- Atomic Mass = P + N
- Electric Charge of Nucleus (ECN) = + P
- Electric Charge of Electron Shells (ECE) = - E

#	Name	Atomic Symbol	Atomic Number (AN)	Atomic Mass (AM, amu)	Number of			Electric Charge of	
					Protons (P)	Neutrons (N)	Electrons (E)	Nucleus (ECN, + units)	Electron Shells (ECE, - units)
1			6			6			
2				14	7				
3						8	8		
4			10	20					
5					11	12			
6						14	13		
7				40		22			
8				39	19				
9						20	20		
10						18		+17	
11			26			30			
12				64	29				
13						35	30		
14						61			-47
15				197	79				
16				127			53		
17			80			121			
18				207	82				
19						146	92		
20				1		0			

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Exercise 2: Molecules

2.1. Complete the following table. The atom counts are written in the exact order they appear in the chemical formula.

#	Chemical Formula	Name of Substance	Number of Atoms of Each Element
1	H_2O	Water	
2		Carbon Dioxide	C:1, O:2
3	NaCl	Sodium Chloride (Table Salt)	
4		Ammonia	N:1, H:3
5	$CaCO_3$	Calcium Carbonate	
6		Methane	C:1, H:4
7	H_2SO_4	Sulfuric Acid	
8		Sodium Hydroxide	Na:1, O:1, H:1
9	$K_2Cr_2O_7$	Potassium Dichromate	
10		Glucose	C:6, H:12, O:6

#	Chemical Formula	Name of Substance	Number of Atoms of Each Element
11	Al_2O_3	Aluminum Oxide	
12		Phosphoric Acid	H:3, P:1, O:4
13	HNO_3	Nitric Acid	
14		Ethanol (Simple Alcohol)	C:2, H:6, O:1
15	$Fe(OH)_3$	Iron (III) Hydroxide	
16		Potassium Permanganate	K:1, Mn:1, O:4
17	$CuSO_4$	Copper (II) Sulfate	
18		Hydrochloric Acid	H:1, Cl:1
19	Na_2CO_3	Sodium Carbonate	
20		Magnesium Chloride	Mg:1, Cl:2

2.2. Calculate the **total number of atoms** present in the specified quantity of molecules.

#	Chemical Formula	Name of Substance	Number of Molecules	Number of Atoms of Each Element
1	O_2	Oxygen Gas	8	
2	HCl	Hydrogen Chloride	10	
3	CH_4	Methane	7	
4	$C_6H_{12}O_6$	Glucose	2	

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5	H_3PO_4	Phosphoric Acid	4	
6	K_2CO_3	Potassium Carbonate	5	
7	$C_{12}H_{22}O_{11}$	Sucrose (Sugar)	3	
8	Fe_2O_3	Iron (III) Oxide (Rust)	6	
9	$LiNO_3$	Lithium Nitrate	9	
10	SO_2	Sulfur Dioxide	11	

Exercise 3: Elementary Substances and Compounds

Determine if the substance is an **Elementary Substance** *(made of only one type of atom)* or a **Compound** *(made of two or more types of atoms)*.

#	Chemical Formula	Name of Substance	Type of Substance
1	O_3	Ozone	
2	H_2O_2	Hydrogen Peroxide	
3	S_8	Sulfur	
4	$CaCO_3$	Calcium Carbonate (Limestone)	
5	N_2	Nitrogen Gas	
6	Fe	Iron	
7	$C_{10}H_8$	Naphthalene	
8	P_4	White Phosphorus	
9	KCl	Potassium Chloride	
10	Au	Gold	

#	Chemical Formula	Name of Substance	Type of Substance
11	Mg	Magnesium	
12	CO	Carbon Monoxide	
13	H_2SO_4	Sulfuric Acid	
14	Br_2	Bromine	
15	C	Carbon (Graphite)	
16	Ne	Neon Gas	
17	NH_3	Ammonia	
18	C_2H_2	Ethyne (Acetylene)	
19	Ag	Silver	
20	NO_2	Nitrogen Dioxide	

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