

MOLE DRILL SHEET

1. Determine the mass of the following:

[rearrange the formula $n = m/M$ to $m = n \times M$ to get the answers]

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| (a) 1.0 mol of Na. [ans: 23g] | (h) 0.25 mol of C |
| (b) 3.0 mol of Na. [ans: 69g] | (i) 4.8 mol of CH_4 |
| (c) 0.03 mol of Na. [ans: 0.69g] | (j) 2.0 mol of CH_3COOH |
| (d) 4.0 mol of Cr [ans: $2.1 \times 10^2 \text{g}$] | (k) 2.0 mol of $(\text{NH}_4)_2\text{SO}_4$ |
| (e) 1.0 mol of H_2 [ans: 2.0g] | (l) 3.0 mol of $\text{BeSO}_4 \cdot 4\text{H}_2\text{O}$ |
| (f) 1.2 mol of Te [ans: $1.5 \times 10^2 \text{g}$] | (m) 0.12 mol of C_6H_6 |
| (g) 0.11 mol of S [ans: 3.5g] | (n) 2.0 mol of CuSO_4 |

2. Determine the number of moles in each of the following:

[use the formula $n = m/M$]

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| (a) 708 g of Cl_2 [ans: 9.97mol] | (h) 4.7g of BeF_2 |
| (b) 699g of Li [ans: 101mol] | (i) 0.344g of $\text{Cr}_2(\text{SO}_3)_3$ |
| (c) 1.26g of I_2 [ans: 0.00496mol] | (j) 2.15g of $\text{Cu}(\text{C}_2\text{H}_3\text{O}_2)_2$ |
| (d) 1.4g of N_2 [ans: 0.050mol] | (k) 110g of P_2S_3 |
| (e) 23g of N_2 [ans: 0.82mol] | (l) 1.23g of TiF_4 |
| (f) 9.0 g of Be [ans: 1.0mol] | (m) 2.698g of Al |
| (g) 1.0g of H_2 [ans: 0.50mol] | (n) 224g of Zn_3N_2 |

3. Determine the number of particles in each case:

[rearrange the formula $n = N/N_A$ to $N = n \times N_A$ to get the answers. Recall: $N_A = 6.02 \times 10^{23}$ entities/mol]

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|---|---|
| (a) Neon atoms in 1.0 mol of Neon atoms. | [ans: 6.02×10^{23} Ne atoms] |
| (b) Oxygen molecules in 1.0 mole of oxygen molecules (O_2) | [ans: 6.02×10^{23} O_2 moles] |
| (c) Oxygen atoms in 1.0 mole of oxygen atoms. | [ans: 6.02×10^{23} O atoms] |
| (d) Oxygen atoms in 1.0 mole of oxygen molecules. | [ans: 1.2×10^{24} O atoms] |
| (e) Molecules of CuSO_4 in 2.0 mol of CuSO_4 | [ans: 1.2×10^{24} CuSO_4 moles] |
| (f) Atoms of Cu in 2.0 mol of CuSO_4 | |
| (g) Atoms of S in 2.0 mol of CuSO_4 | |
| (h) Atoms of oxygen in 2.0 mol of CuSO_4 | |
| (i) Moles of atoms in 2.0 mol of CuSO_4 | |

4. Determine the number of moles in each of the following:

[use the formula $n = N/N_A$ Recall: $N_A = 6.02 \times 10^{23}$ entities/mol]

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|---|---|
| (a) 12.04×10^{23} atoms of Zn [a: 1.993mol] | (e) 1.0×10^{22} molecules of NO_2 |
| (b) 3.02×10^{20} atoms of Cu [a: 0.000502mol] | (f) 1.50×10^{25} molecules of H_2SO_4 |
| (c) 2.01×10^{24} atoms of Pb [a: 0.334mol] | (g) 300 molecules of water |
| (d) 1.80×10^{25} chemistry teachers [a: 29.9 teachers] | (h) 9.03×10^{25} molecules in $\text{Al}_2(\text{SO}_4)_3$ |

5. Determine the mass of the following: [2 step problem. Need to use BOTH mole formulas]

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|---|---|
| (a) 3.01×10^{24} atoms of Fe [a: 280g] | (e) 12.01×10^{23} molecules of CO_2 |
| (b) 6.02×10^{22} atoms of Ba [a: 13.7g] | (f) 50 molecules of water |
| (c) 2.5×10^{26} atoms of Al [a: $1.1 \times 10^4 \text{g}$] | (g) 3.01×10^{22} molecules of $\text{Al}_2(\text{SO}_4)_3$ |
| (d) 1 atom of S [a: $5 \times 10^{-23} \text{g}$] | |

6. Calculate the following:

- (a) The number of atoms in 31.0g of P.
- (b) The number of atoms in 72.0g of C.
- (c) The number of atoms in 9.0g of Al.
- (d) The number of atoms in 1.0g of Cu.
- (e) The number of molecules in 18.0g of H_2O .
- (f) The number of molecules in 4.9g of H_2SO_4 .
- (g) The number of molecules in 1.0g of $\text{Al}(\text{NO}_3)_3$.
- (h) The number of oxygen atoms in 9.8g of H_2SO_4 .
- (i) The number of oxygen atoms in $\text{Ca}_3(\text{PO}_4)_2$.

Stuck? Check out these videos for solutions to the more challenging problems:

Solutions Part 1:

<https://youtu.be/Xk2FsojmTPo>

Solutions Part 2:

<https://youtu.be/us0UIQWDPOw>