

## CHE 105 SU17 Exam 1

Your Name: \_\_\_\_\_

Your ID: \_\_\_\_\_

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### Question #: 1

The state of matter in which atoms or molecules do not have a fixed volume or shape and are free to move relative to each other is a   1   [solid, liquid, gas].

1. \_\_\_\_\_

---

### Question #: 2

Ethanol is a common laboratory solvent and has a density of 0.789 g/mL. What is the mass of 115 mL of ethanol? Report your answer with **three** significant figures. Do **NOT** include units with your answer.

  1   grams

1. \_\_\_\_\_

---

### Question #: 3

Which statement describes a **chemical** change?

- A. Water evaporates to form a cloud.
  - B. Ethanol is distilled from mixture containing ethanol and water.
  - C. Gasoline is combusted in an automobile engine.
  - D. Scrap iron is removed from a heap of material using an electromagnet.
-

Question #: 4

Which one is a **homogenous mixture**?

- A. helium
  - B. air
  - C. water
  - D. wet sand
- 

Question #: 5

Which one is **not** an intensive property?

- A. odor
  - B. melting point
  - C. density
  - D. volume
- 

Question #: 6

How many significant figures are in the number below?

Report your answer using a whole number (e.g., 1, 2, 3, etc). Do **NOT** include units in your answer.

$$0.004508590 = \underline{\quad 1 \quad} \text{ significant figures}$$

1. \_\_\_\_\_

---

**Question #: 7**

What is the result of the following calculation?

Report your answer to the **correct** number of significant figures. Your answer must have the correct number of significant figures to be counted correct.

$$\frac{(2.267 \times 10^{16})}{(3.05 \times 10^{13})} + 4.313 = \underline{\quad 1 \quad}$$

1. \_\_\_\_\_

---

**Question #: 8**

Write 0.0000911 in proper scientific notation. Report your answer with the format 2.22E2 or 2.22E-2

1

1. \_\_\_\_\_

---

**Question #: 9**

How many nanoliters are in 2.0 liters?

- A.  $2.0 \times 10^4$  nL
  - B.  $2.0 \times 10^5$  nL
  - C.  $2.0 \times 10^9$  nL
  - D.  $2.0 \times 10^{11}$  nL
-

**Question #:** 10

An office heater puts out  $2.02 \times 10^3$  BTUs (British thermal units) of heat energy per hour. How many megajoules of heat energy are produced annually if the heater is operated 4 hours per day for the entire year? 1 BTU = 1.055 kJ, 1 year = 365 days

Report your answer with **three** significant figures. Do **NOT** include units with your answer. Use the format 2.22E2 or 2.22E-2 for answers in scientific notation.

  1   MJ

1. \_\_\_\_\_

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**Question #:** 11

How many milliliters are in 5.7 gallons?

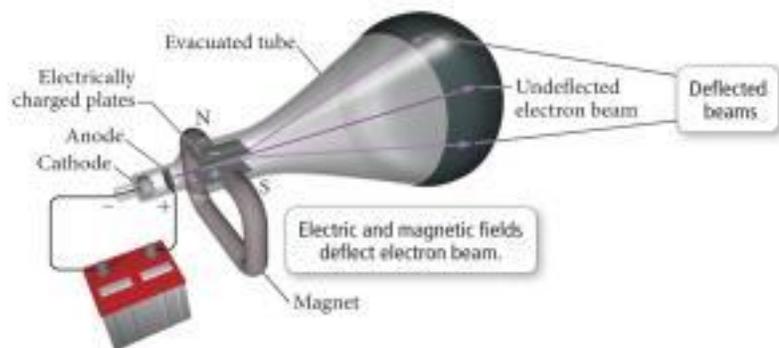
- A. 1.5 mL
  - B.  $3.2 \times 10^4$  mL
  - C.  $2.2 \times 10^4$  mL
  - D.  $2.8 \times 10^4$  mL
- 

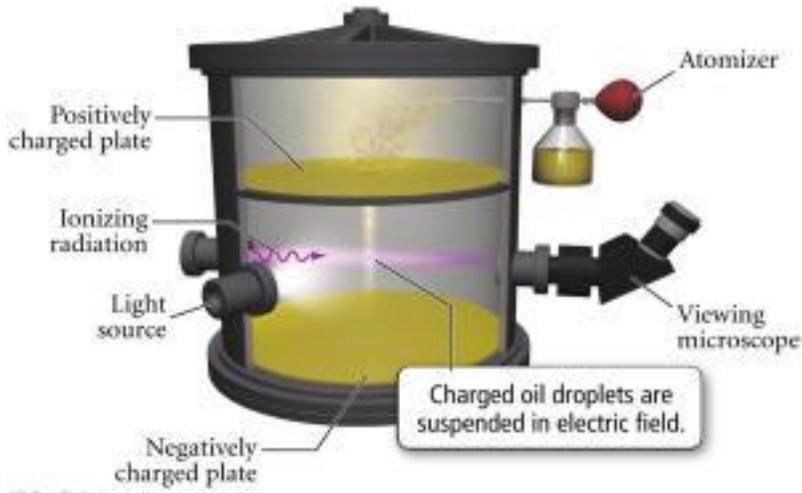
**Question #:** 12

Consider the experiments, labeled Thomson and Millikan, shown below:

**Thomson.**

**Millikan.**





Match the experiment with the result:

Measured the charge of an electron   1   [Thomson or Millikan]

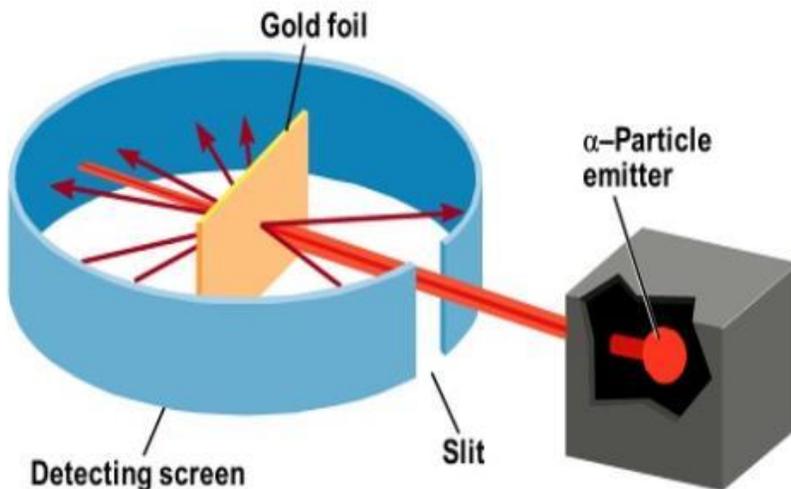
Measured the mass-to-charge ratio of an electron   2   [Thomson or Millikan]

Discovered the electron   3   [Thomson or Millikan]

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

**Question #:** 13

Consider the figure describing Rutherford's gold foil experiment below and select **two** **conclusions** that were a result of the experiment.



- A. the mass of the atom is spread out uniformly over the atom's volume.
  - B. the atom contains little empty space.
  - C. the mass of the atom is concentrated at the center.
  - D. the core of the atom is positively charged.
- 

**Question #:** 14

Complete the Table Below.

Atomic Number	Protons	Electrons	Ion Charge	Element Symbol
Blank <u>  1  </u>	12	Blank <u>  2  </u>	2+	Blank <u>  3  </u>

Do **NOT** include units in your answer.

- 1. \_\_\_\_\_
  - 2. \_\_\_\_\_
  - 3. \_\_\_\_\_
- 

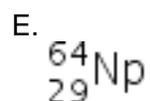
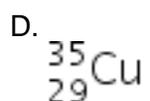
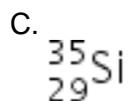
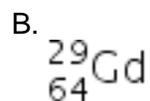
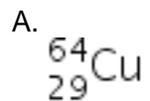
**Question #:** 15

John Dalton proposed that all atoms of a given element are identical. Select the correct revision to Dalton's postulate as a result of experimental evidence:

- A. All atoms of a given element have an identical number of protons.
  - B. All atoms of a given element have an identical number of neutrons.
  - C. All atoms of a given element have an identical number of electrons.
  - D. Dalton's postulate shouldn't change and is correct as stated above.
-

Question #: 16

Choose the isotope symbol for a **neutral atom** with a mass number of 64 and an atomic number of 29.



Question #: 17

Choose the quantity that contains the **largest number** of **moles**.

- A. 127 g of gold
  - B. 6.01 g of lithium
  - C. 84.0 g of krypton
  - D. 35.0 g of potassium
-

Question #: 18

On another planet, the isotopes of titanium have the following natural abundances:

Isotope	Abundance	Mass (amu)
$^{46}\text{Ti}$	70.200%	45.95
$^{48}\text{Ti}$	10.300%	47.94
$^{50}\text{Ti}$	19.500%	49.94

What is the average atomic mass of titanium on that planet?

  1   amu

Report your answer with **four significant figures**. Do NOT include units in your answer.

1. \_\_\_\_\_

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Question #: 19

The name of  $\text{TiS}_2$  is:

- A. titanium sulfide
  - B. titanium(II) sulfide
  - C. titanium(IV) sulfide
  - D. titanium disulfide
  - E. titanium sulfate
- 

Question #: 20

Select the **two** ionic compounds.

- A.  $\text{C}_2\text{Cl}_4\text{F}_2$
  - B.  $\text{K}_2\text{O}$
  - C.  $\text{NH}_4\text{NO}_3$
  - D.  $\text{SF}_6$
-

Question #: 21

What is the chemical name for  $\text{SeO}_3$ ?

- A. selenium oxide
  - B. selenium trioxygen
  - C. selenic oxygen
  - D. selenium trioxide
- 

Question #: 22

How many **atoms** are in 32.8 grams of sulfur dioxide?

Report your answer with **three** significant figures. Do **NOT** include units with your answer. Report your answer with the format 2.22E2 or 2.22E-2

  1   atoms

1. \_\_\_\_\_

---

Question #: 23

How many grams of fluorine are in 445 grams of  $\text{CaF}_2$ ?

Report your answer with **three** significant figures. Do **NOT** include units in your answer.

  1   grams

1. \_\_\_\_\_

---

Question #: 24

The **molecular** formula for the compound with an empirical formula of  $\text{NH}_2\text{Cl}$  and a molar mass is 154.4 g/mol is N   1   H   2   Cl   3  . Fill in each blank with a **whole number**.

1. \_\_\_\_\_

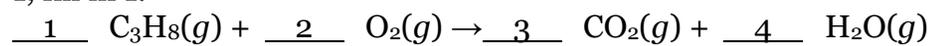
2. \_\_\_\_\_

3. \_\_\_\_\_

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Question #: 25

Balance this chemical equation for the reaction of propane with oxygen gas with the smallest possible **whole** numbers by filling in each blank with the proper coefficient. If the coefficient is 1, fill in 1.



1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

4. \_\_\_\_\_

**DRAFT**  
Do Not Use Until Posted.

## CHE 105 SU17 Exam 1 - Confidential

Your Name: \_\_\_\_\_

Your ID: \_\_\_\_\_

**Periodic Table of the Elements**

1	2											13	14	15	16	17	18
1	2											3	4	5	6	7	8
H	He											B	C	N	O	F	Ne
1.008	4.003											10.81	12.01	14.01	16.00	19.00	20.18
3	4											13	14	15	16	17	18
Li	Be											Al	Si	P	S	Cl	Ar
6.941	9.012											28.98	28.09	30.97	32.07	35.45	39.95
11	12	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Na	Mg	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
22.99	24.31	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
39.10	40.08	44.96	47.87	50.94	52.00	54.94	55.85	58.93	58.69	63.55	65.41	69.72	72.64	74.92	78.96	79.90	83.80
37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
85.47	87.62	88.91	91.22	92.91	95.94	98	101.1	102.9	106.4	107.9	112.4	114.8	118.7	121.8	127.6	126.9	131.3
55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
Cs	Ba	La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf
132.9	137.3	175.0	178.5	180.9	183.8	186.2	190.2	192.2	195.1	197.0	200.6	204.4	207.2	209.0	209	210	222
87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104
Fr	Ra	Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr	Rf
223	226	227	232.0	231.0	238.0	237	239	243	247	247	251	252	257	258	259	261	261
		lanthanides (see earth)															
		57	58	59	60	61	62	63	64	65	66	67	68	69	70		
		La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb		
		138.9	140.1	140.9	144.2	145	150.4	152.0	157.3	158.9	162.5	164.9	167.3	168.9	173.0		
		actinides															
		89	90	91	92	93	94	95	96	97	98	99	100	101	102		
		Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No		
		227	232.0	231.0	238.0	237	239	243	247	247	251	252	257	258	259		

Molar volume of ideal gas at STP = 22.4 L	Ideal gas constant: $R = 8.314 \text{ J}\cdot\text{K}^{-1}\cdot\text{mol}^{-1}$	Speed of light, $c = 3.00 \times 10^8 \text{ m}\cdot\text{s}^{-1}$
Faraday constant, $F = 9.6485 \times 10^4 \text{ C}\cdot\text{mol}^{-1}$	$R = 1.987 \text{ cal}\cdot\text{K}^{-1}\cdot\text{mol}^{-1}$	Rydberg constant, $R_H = 2.18 \times 10^{-18} \text{ J}$
Avogadro's number, $N = 6.022 \times 10^{23} \text{ mol}^{-1}$	$R = 8.206 \times 10^{-2} \text{ L}\cdot\text{atm}\cdot\text{K}^{-1}\cdot\text{mol}^{-1}$	Electron charge, $e = 1.602 \times 10^{-19} \text{ C}$
Planck's constant, $h = 6.626 \times 10^{-34} \text{ J}\cdot\text{s}$		Atomic mass unit, $u = 1.6605 \times 10^{-24} \text{ g}$

*attachment\_for\_pubExamUID\_Inxp114981628543311091XX\_198.jpg*

### Question #: 1

The state of matter in which atoms or molecules do not have a fixed volume or shape and are free to move relative to each other is a 1 [solid, liquid, gas].

1. gas|Gas|

### Question #: 2

Ethanol is a common laboratory solvent and has a density of 0.789 g/mL. What is the mass of 115 mL of ethanol? Report your answer with **three** significant figures. Do **NOT** include units with your answer.

1 grams

1. 90.7|90.6|90.8|

---

**Question #: 3**

Which statement describes a **chemical** change?

- A. Water evaporates to form a cloud.
  - B. Ethanol is distilled from mixture containing ethanol and water.
  - ✓C. Gasoline is combusted in an automobile engine.
  - D. Scrap iron is removed from a heap of material using an electromagnet.
- 

**Question #: 4**

Which one is a **homogenous mixture**?

- A. helium
  - ✓B. air
  - C. water
  - D. wet sand
- 

**Question #: 5**

Which one is **not** an intensive property?

- A. odor
  - B. melting point
  - C. density
  - ✓D. volume
- 

**Question #: 6**

How many significant figures are in the number below?

Report your answer using a whole number (e.g., 1, 2, 3, etc). Do **NOT** include units in your answer.

0.004508590 = 1 significant figures

1. 7|seven|

---

**Question #: 7**

What is the result of the following calculation?

Report your answer to the **correct** number of significant figures. Your answer must have the correct number of significant figures to be counted correct.

$$\frac{(2.267 \times 10^{16})}{(3.05 \times 10^{13})} + 4.313 = \underline{\quad 1 \quad}$$

1. 748|7.48e2|

---

**Question #: 8**

Write 0.0000911 in proper scientific notation. Report your answer with the format 2.22E2 or 2.22E-2

1

1. 9.11e-5|9.11E-5|

---

**Question #: 9**

How many nanoliters are in 2.0 liters?

- A.  $2.0 \times 10^4$  nL
  - B.  $2.0 \times 10^5$  nL
  - ✓ C.  $2.0 \times 10^9$  nL
  - D.  $2.0 \times 10^{11}$  nL
- 

**Question #: 10**

An office heater puts out  $2.02 \times 10^3$  BTUs (British thermal units) of heat energy per hour. How many megajoules of heat energy are produced annually if the heater is operated 4 hours per day for the entire year? 1 BTU = 1.055 kJ, 1 year = 365 days

Report your answer with **three** significant figures. Do **NOT** include units with your answer. Use the format 2.22E2 or 2.22E-2 for answers in scientific notation.

1 MJ

1. 3.11e3|3.11E3|

---

**Question #:** 11

How many milliliters are in 5.7 gallons?

- A. 1.5 mL
- B.  $3.2 \times 10^4$  mL
- ✓C.  $2.2 \times 10^4$  mL
- D.  $2.8 \times 10^4$  mL

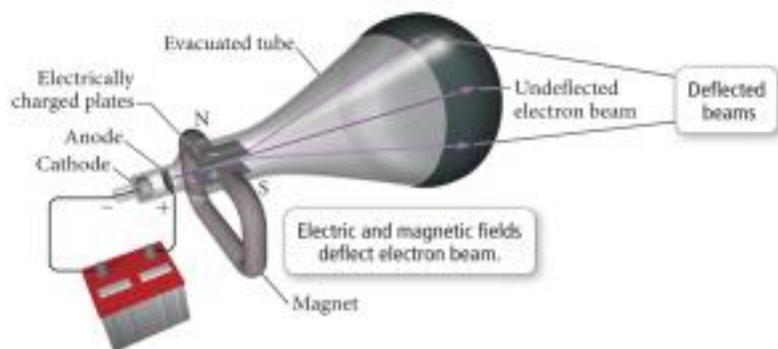
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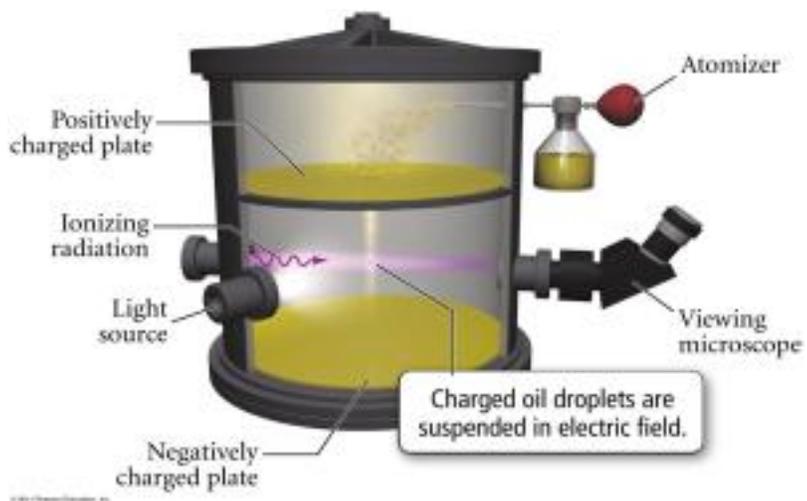
**Question #:** 12

Consider the experiments, labeled Thomson and Millikan, shown below:

**Thomson.**

**Millikan.**





Match the experiment with the result:

Measured the charge of an electron   1   [Thomson or Millikan]

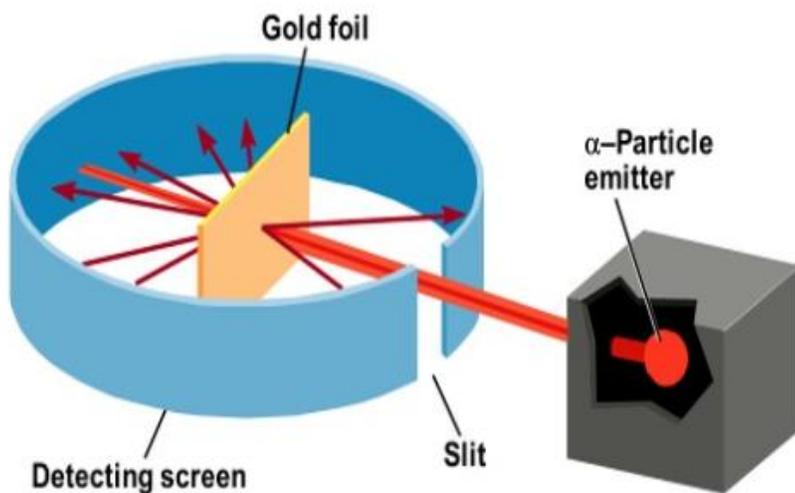
Measured the mass-to-charge ratio of an electron   2   [Thomson or Millikan]

Discovered the electron   3   [Thomson or Millikan]

1. Millikan
2. Thomson
3. Thomson

**Question #:** 13

Consider the figure describing Rutherford's gold foil experiment below and select **two conclusions** that were a result of the experiment.



- A. the mass of the atom is spread out uniformly over the atom's volume.
- B. the atom contains little empty space.
- ✓C. the mass of the atom is concentrated at the center.
- ✓D. the core of the atom is positively charged.

---

**Question #: 14**

Complete the Table Below.

Atomic Number	Protons	Electrons	Ion Charge	Element Symbol
Blank 1	12	Blank 2	2+	Blank 3

Do **NOT** include units in your answer.

1. 12|twelve|
2. 10|ten|
3. Mg|Mg<sup>2+</sup>|

---

**Question #: 15**

John Dalton proposed that all atoms of a given element are identical. Select the correct revision to Dalton's postulate as a result of experimental evidence:

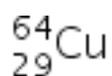
- ✓A. All atoms of a given element have an identical number of protons.
- B. All atoms of a given element have an identical number of neutrons.
- C. All atoms of a given element have an identical number of electrons.
- D. Dalton's postulate shouldn't change and is correct as stated above.

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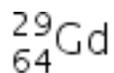
**Question #: 16**

Choose the isotope symbol for a **neutral atom** with a mass number of 64 and an atomic number of 29.

✓A.



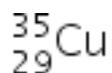
B.



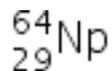
C.



D.



E.



---

**Question #: 17**

Choose the quantity that contains the **largest number** of **moles**.

- A. 127 g of gold
- B. 6.01 g of lithium
- ✓C. 84.0 g of krypton
- D. 35.0 g of potassium

---

**Question #: 18**

On another planet, the isotopes of titanium have the following natural abundances:

Isotope	Abundance	Mass (amu)
${}^{46}\text{Ti}$	70.200%	45.95
${}^{48}\text{Ti}$	10.300%	47.94
${}^{50}\text{Ti}$	19.500%	49.94

What is the average atomic mass of titanium on that planet?

1 amu

Report your answer with **four significant figures**. Do NOT include units in your answer.

1. 46.93|46.94|46.92|

---

**Question #:** 19

The name of  $\text{TiS}_2$  is:

- A. titanium sulfide
  - B. titanium(II) sulfide
  - ✓C. titanium(IV) sulfide
  - D. titanium disulfide
  - E. titanium sulfate
- 

**Question #:** 20

Select the **two** ionic compounds.

- A.  $\text{C}_2\text{Cl}_4\text{F}_2$
  - ✓B.  $\text{K}_2\text{O}$
  - ✓C.  $\text{NH}_4\text{NO}_3$
  - D.  $\text{SF}_6$
- 

**Question #:** 21

What is the chemical name for  $\text{SeO}_3$ ?

- A. selenium oxide
  - B. selenium trixygen
  - C. selenic oxygen
  - ✓D. selenium trioxide
- 

**Question #:** 22

How many **atoms** are in 32.8 grams of sulfur dioxide?

Report your answer with **three** significant figures. Do **NOT** include units with your answer.

Report your answer with the format 2.22E2 or 2.22E-2

  1   atoms

1. 9.25e23|9.25E23|9.24e23|9.24E23|9.26e23|9.26E23|

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**Question #: 23**

How many grams of fluorine are in 445 grams of CaF<sub>2</sub>?

Report your answer with **three** significant figures. Do **NOT** include units in your answer.

  1   grams

1. 216|217|215|

---

**Question #: 24**

The **molecular** formula for the compound with an empirical formula of NH<sub>2</sub>Cl and a molar mass is 154.4 g/mol is N   1   H   2   Cl   3  . Fill in each blank with a **whole number**.

1.   3  

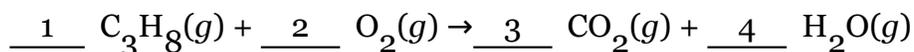
2.   6  

3.   3  

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**Question #: 25**

Balance this chemical equation for the reaction of propane with oxygen gas with the smallest possible **whole** numbers by filling in each blank with the proper coefficient. If the coefficient is 1, fill in 1.



1.   1  

2.   5  

3.   3  

4.   4