

## Chapter 6 Problems - Chemical Reactions, Calculations and Energy Considerations

Select the correct scientific notation representation of each of the following numbers:

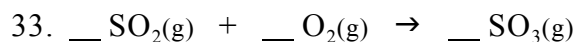
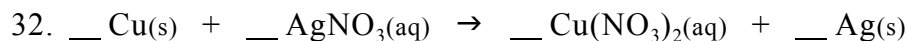
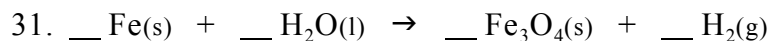
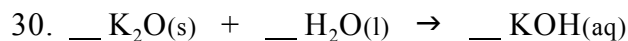
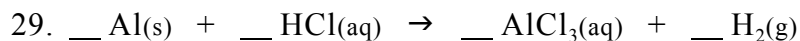
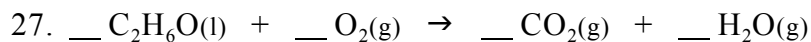
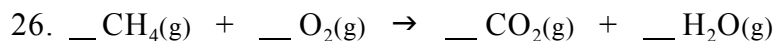
	<i>number</i>	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>answer</i>
1.	0.08206	$8.206 \times 10^2$	0.08206	$8.206 \times 10^{-2}$	none	_____
2.	150.5	$1.505 \times 10^2$	150	$1.50 \times 10^{-2}$	none	_____
3.	0.153	0.153	$1.53 \times 10^{-1}$	$1.50 \times 10^{-1}$	none	_____
4.	8314	8314	$8.314 \times 10^{-3}$	$83.14 \times 10^3$	none	_____
5.	22.4	22.4	$2.24 \times 10^{-1}$	$2.24 \times 10^1$	none	_____
6.	0.003	0.003	$3 \times 10^{-3}$	$3 \times 10^{-2}$	none	_____
7.	$\frac{3 \times 10^{22}}{6 \times 10^{23}}$	$5 \times 10^{-1}$	$5 \times 10^{44}$	$5 \times 10^{-2}$	none	_____
8.	$1/(5 \times 10^{23})$	$2 \times 10^{-24}$	$2 \times 10^{-23}$	$2 \times 10^{22}$	none	_____
9.	$(6.0 \times 10^{23})(2.0 \times 10^{-4})$	$1.2 \times 10^{20}$	$1.2 \times 10^{19}$	$1.2 \times 10^{28}$	none	_____
10.	$3.0 \times 10^4 + 6 \times 10^3$	$9 \times 10^4$	$9 \times 10^7$	$3.6 \times 10^4$	none	_____
11.	$7.2 \times 10^{-4} / 8.0 \times 10^{-2}$	$9.0 \times 10^{-1}$	$9.0 \times 10^{-2}$	$9.0 \times 10^{-3}$	none	_____
12.	$4.8 \times 10^3 / 6.0 \times 10^{-2}$	$8.0 \times 10^{-2}$	$8.0 \times 10^8$	$8.0 \times 10^2$	none	_____
13.	$7.7 \times 10^{-1} / 1.1 \times 10^3$	$7.0 \times 10^{-4}$	$7 \times 10^{-4}$	$7.0 \times 10^{-5}$	none	_____
14.	<p>In 1897, J. J. Thompson, using a Crooke's tube, determined a value for the charge to mass ratio (e/m) of the electron close to the currently accepted value of <math>1.76 \times 10^8</math> coulombs/g. In 1909, R. A. Millikan, using his famous oil drop experiment, determined the value of e to be close to the currently accepted value of <math>1.6022 \times 10^{-19}</math> coulombs. Using a unit conversion, calculate the mass of an electron.</p> <p>a. <math>9.10 \times 10^{-28}</math> g   b. <math>2.82 \times 10^{-11}</math> g   c. <math>1.09 \times 10^{27}</math> g   d. none</p>					_____
15.	<p>The e/m value for a proton is <math>9.577 \times 10^4</math> coulombs/g. Calculate the mass of a proton.</p> <p>a. <math>1.59 \times 10^{23}</math> g   b. <math>1.67 \times 10^{-24}</math> g   c. <math>1.53 \times 10^{-14}</math> g   d. none</p>					_____

Determine the following:

16. The atomic mass of xenon  
a. 66.39 g/mol b. 83.80 g/mol c. 131.29 g/mol d. 262.58 g/mol  
e. none \_\_\_\_\_
17. The formula mass of molecular oxygen  
a. 32.00 g/mol b. 16.00 g/mol c. 8.00 g/mol d. 48 g/mol e. none \_\_\_\_\_
18. The molecular mass of water  
a. 17.01 g/mol b. 18.02 g/mol c. 34.02 g/mol d. 0.1803 g/mol e. none \_\_\_\_\_
19. The number of moles in 2.3 g of ethanol ( $C_2H_6O$ )  
a. 20 moles b. 106 moles c. 0.068 moles d. 0.050 moles e. none \_\_\_\_\_
20. The number of moles in 0.40 g of argon  
a.  $1.0 \times 10^{-3}$  b.  $5.0 \times 10^{-4}$  c. 1.0 moles d.  $1.0 \times 10^3$  moles e. none  
\_\_\_\_\_
21. The mass in grams of  $2.0 \times 10^{-3}$  moles of CO  
a.  $7.1 \times 10^{-5}$  g b.  $1.4 \times 10^4$  g c. 56 g d. 0.056 g e. none \_\_\_\_\_
22. The number of molecules in 36 g of water  
a. 2.0 molecules b.  $6.0 \times 10^{23}$  molecules c.  $1.2 \times 10^{24}$  molecules d. none \_\_\_\_\_
23. The number of moles in  $3.0 \times 10^{24}$  molecules of carbon dioxide  
a. 5.0 moles b. 0.20 molecules g c.  $1.8 \times 10^{48}$  molecules  
d.  $9.0 \times 10^1$  molecules e. none \_\_\_\_\_
24. The mass in grams of 1 atom of argon  
a.  $4.2 \times 10^{-26}$  g b.  $1.5 \times 10^{22}$  g c. 0.025 g d.  $6.6 \times 10^{-23}$  g e. none \_\_\_\_\_

**Multiple Choice Questions**

Questions 26 - 34 following page refer to the unbalanced reactions below.



For questions #26 - 34 , determine the lowest whole number sum of the coefficients.

After balancing,  $\text{Na} + \text{H}_2\text{O} \rightarrow \text{NaOH} + \text{H}_2$  becomes  $2 \text{Na} + 2 \text{H}_2\text{O} = 2 \text{NaOH} + \text{H}_2$   
and the sum of the coefficients =  $2 + 2 + 2 + 1 = 7$ .

rxn.	a	b	c	d	answer
26.	4	8	6	none	_____
27.	8	9	12	none	_____
28.	3	4	5	none	_____
29.	12	13	4	none	_____
30.	4	3	6	none	_____
31.	11	12	16	none	_____
32.	6	4	5	none	_____
33.	3	5	4	none	_____
34.	5	3	7	none	_____