Answer the following questions on the answer sheet.

$N_A = 6.022 \times 10^{23}\ \text{mol}^{-1}$ $T_K = t_{\circ C} + 273.15$

1) Calculate the density of a piece of metal that has a mass of 264 g and a volume of 29.7 mL.

2) Calculate the number of moles there are in 17.2 g of CH_4?

3) How many molecules are there in 26.5 moles of CH_4?

4) How many grams of Na_2PO_4 are produced by reacting 3.63 g of NaOH with an excess of H_3PO_4?
The reaction is: $H_3PO_4 + 3NaOH \rightarrow Na_3PO_4 + 3H_2O$

5) What is the percent Fe, P and O in the compound: $FePO_4$.

6) How many grams of Na_3PO_4 are produced by reacting 2.29 g of NaOH with 2.06 g of H_3PO_4?
The reaction is: $H_3PO_4 + 3NaOH \rightarrow Na_3PO_4 + 3H_2O$

7) Which of the following is a characteristic of a scientific theory?
A) A theory is always tentative.
B) A theory is never really useful for practical applications
C) Beyond the original proof, theories cannot be proven.
D) Beyond the original proof, theories cannot be proven.
E) A theory must eventually be proven to be valid.

8) Convert 10.5 mg to grams.

9) Give the answer to the following operation to the correct number of significant figures.

$$\frac{4.12 + 9.35}{1.3141}$$

10) How many protons and neutrons are there in the isotope ^{41}K ?

11) Complete the following reaction. $CH_3NH_3 + H_2O \rightarrow$

12) Complete the following reaction. $CH_3COOH + H_2O \rightarrow$

13) Which of the following is an Arrhenius acid?
A) $Pb(NO_3)_2$
B) $Ca(OH)_2$
C) NH_3
D) HNO_3
E) AgCl

14) A sample consists of 100g of iron and 43.30 g in NaCl. What is the percent NaCl?

15) Which of the following compounds is a totally ionic compound?

A) $NaNO_3$ **B)** CH_4 **C)** HCl **D)** CH_3COOH **E)** NaCl

16) Which of the following compounds is a totally covalent compound?

A) HCl **B)** NaOH **C)** KCl **D)** UH_3 **E)** KH

17) How much is 169.63 °C in kelvins?

18) A compound is 36.5% Na 25.4% S and 38.1% O. What is the empirical formula for this compound?

19) How many significant digits does the number 0.0131 have?

20) What phase retains its volume but conforms to the shape of the container?

NAME_____

For question 13, 15 and 16 circle the correct answer.

1) _____ _____ (units)

2) _____ _____ (units)

3) _____

4) _____ _____ (units)

5) Fe = _____ %

P = _____ %

O = _____ %

6) _____ _____ (units)

7) _____

8) _____ _____ (units)

9) _____

10) _____ **protons** _____ **neutrons**

11) $CH_3NH_3 + H_2O \rightarrow$ _____

12) $CH_3COOH + H_2O \rightarrow$ _____

13) **A B C D E**

14) _____ %

15) **A B C D E**

16) **A B C D E**

17) _____ K

18) **Na**_____**S**_____**O**_____

19) _____ **significant figures**

20) _____

KEY

1) 8.89 g mL^{-1}

2) 1.075 mole

3) 1.60E+25

4) 4.96 g

5) Fe = 38.1% P = 20.2% O = 41.7%

6) 3.130 g

7) **A**

8) 0.0105 g

9) 10.25 4 sig. figs.

10) 19 protons, 22 neutrons

11) $CH_3NH_3 + H_2O \rightarrow CH_3NH_4^+ + OH^-$

12) $CH_3COOH + H_2O \rightarrow CH_3COO^- + H_3O^+$

13) **D**

14) 30.22%

15) **E**

16) **A**

17) 442.78 K

18) **$Na_2S_1O_3$**

19) **3 significant figures**

20) liquid