National Chemistry Olympiad 2008

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by ProblemSolver1026

1   Which element is a liquid at $25°C$ and 1.0 atm?

(A) bromine   **(B)** krypton   **(C)** phosphorus   **(D)** xenon

2   Which pair of aqueous solutions produce a yellow precipitate upon mixing?

(A) $AlCl_3$ and KOH **(B)** $Ba(NO_3)_2$ and Na_2SO_4

(C) $Cu(NO_3)_2$ and $NaClO_4$ **(D)** $Pb(C_2H_3O_2)_2$ and KI

3   A student wishes to determine the thickness of a rectangular piece of aluminum foil but cannot measure it
directly. She can measure its density (d), length (l), mass (m) and width (w). Which relationship
will give the thickness?

(A) $\frac{m}{d \cdot l \cdot w}$ **(B)** $\frac{m \cdot l \cdot w}{d}$ **(C)** $\frac{d \cdot l \cdot w}{m}$ **(D)** $\frac{d \cdot m}{l \cdot w}$

5   Which element is the major component in solar cells?

(A) As **(B)** Ge **(C)** P **(D)** Si

8   How many moles of ions are present in 250 mL of a 4.4 M solution of sodium sulfate?

(A) 1.1 **(B)** 2.2 **(C)** 3.3 **(D)** 13

9   How many moles of oxygen gas are produced by the decomposition of 245 g of potassium
chlorate?

$$2\,KClO_3(s) \rightarrow 2\,KCl(s) + 3\,O_2(g)$$
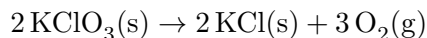
Given:
Molar Mass/ $g \cdot mol^{-1}$ $KClO_3$: 122.6

(A) 1.50 **(B)** 2.00 **(C)** 2.50 **(D)** 3.00

11   For the reaction: $2X + 3Y \rightarrow 3Z$, the combination of 2.00 moles of X with 2.00 moles of Y
produces 1.75 moles of Z. What is the percent yield of this reaction?
(A) 43.8% **(B)** 58.3% **(C)** 66.7% **(D)** 87.5%

17   The value of which property decreases with an increase in the strength of intermolecular forces?

   (A) viscosity   **(B)** boiling point   **(C)** surface tension   **(D)** vapor pressure

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