NAME_____

Year 11 Chemistry Chemical Calculations Assignment 1 Moles and Mass

1.		
	(a) Use an analogy to explain the mole concept. "A mole is like"	/2
	(b) State why a mole is a more useful quantity in chemistry than mass.	/1
2	Calculate the molar mass of the following substances, showing full working:	
2.	(a) Na_2CO_2	/2
	(b) $Mg(NQ_3)_2$	/2
	(c) $FeSi_2O_3.3H_2O$	/2
		,
3.	For each species in the equation below, write its formula and molar mass:	
	$2H_2 + O_2 \rightarrow 2H_2O$	/6
4.	Calculate the number of moles in the following masses:	
	(a) 2.50 g of sodium carbonate (105.99 g mol ⁻¹)	/2
	(b) 0.62 g of NH ₄ Cl	/3
	(c) 1.0 kg of copper sulfate pentahydrate (249.66 g mol ⁻¹)	/3
5.	Calculate the mass of the following:	
	(a) 1.0 moles of nitric acid (63.01 g mol ⁻¹)	/2
	(b) 0.0200 moles of mercury metal	/3
6.	Consider the balanced chemical equation below:	
	$8H^{+} + 5Fe^{2+} + MnO_{4}^{-} \rightarrow 5Fe^{3+} + Mn^{2+} + 4H_{2}O$	
	$n(MnO_4^{-})$	14
	(a) Write the mole ratio $\frac{1}{n(\text{Fe}^{2+})}$.	/1
	(b) Write the mole ratio for one other pair of species.	/2
7.	Consider a reaction in which 3.00 moles of CH ₄ is burnt with excess oxygen according to this equati CH ₄ + 2O ₄ \rightarrow CO ₄ + 2H ₂ O	on:
	(a) State what it means for oxygen to be in 'excess'.	/1
	(b) State the limiting reactant.	, /1
	(c) Suggest one reason why the oxygen is in excess when this reaction is carried out.	/1
	(d) Explain why 3.00 moles of CO_2 will be produced in this reaction.	/2
	$n(\mathrm{H}_{2}\mathrm{O})$	
	(e) State the mole ratio $\frac{1}{n(CH_4)}$.	/1
	(f) Hence determine the number of moles of water produced in this reaction.	/1
	(g) Hence calculate the mass of water produced.	/2
8.	If 7.4 mol of hydrogen gas and 3.6 mol of oxygen gas are ignited, the following reaction occurs:	
	$2\Pi_2 + U_2 \rightarrow 2\Pi_2 U$ (a) Determine which reactant is in excess	/ว
	(a) Determine which reducing is in excess. (b) Determine the number of moles of water produced	/3 /1
	(b) Determine the number of moles of water produced.	72

TOTAL /45