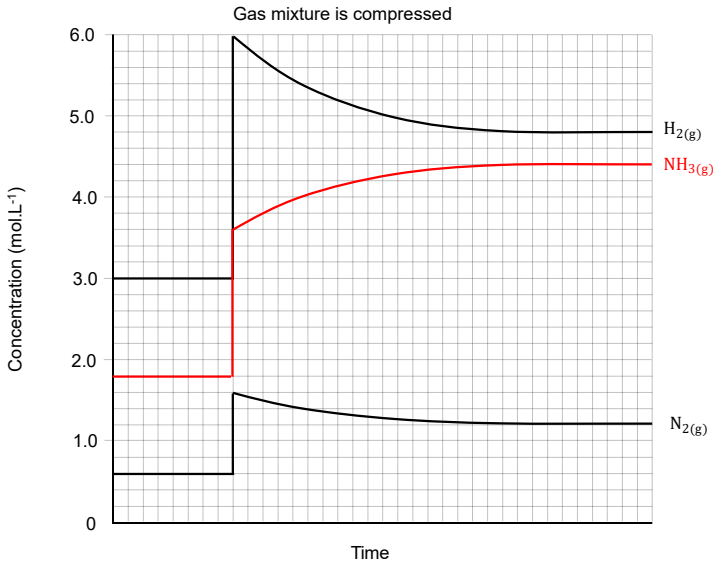
Solutions: Review Test 2

Question	Part		Author's response				Marks
1	(a)		$K_c = \frac{[NH_3]^2}{[N_2][H_2]^3}$				2
	(b)	(1)		N_2	H_2	NH_3	
			Initial concentration (mol.L^{-1})	0.4	1.2	0	1+1
			Change in concentration (mol.L^{-1})	−0.3	−0.9	+0.6	1
			Equilibrium concentration (mol.L^{-1})	0.1	0.3	0.6	
		(2)	$K_c = \frac{[NH_3]^2}{[N_2][H_2]^3}$				
			$K_c = \frac{[0.60]^2}{[0.10]0.30^3}$				1
			$K_c = 133$				1
	(c)		**Advantage:** Increases the rate of formation of ammonia.				1
			Disadvantage: Reduces equilibrium yield of ammonia as the forward reaction is exothermic.				1
	(d)	(1)					
			The concentration of ammonia increases by 2.0 mol.L^{-1} at the instant the pressure is increased; Concentration then increases by 0.8 mol.L^{-1} until equilibrium is established; The line becomes flat at equilibrium when the concentration is constant with time.				1 1 1
		(2)	There are fewer moles of gases on the right-hand side of the reaction arrows; The position of the equilibrium shifts to the right when pressure is increased; The concentration of ammonia increases with pressure.				1 1 1
		(3)	Greater surface area to volume ratio; Increases the rate of formation of ammonia.				1 1
	(e)		No effect as K_c is only affected by changing temperature.				1
	(f)		Some ammonia was removed as the concentration of ammonia decreases instantly; Equilibrium shifts to counteract the change by producing more ammonia; The position of the equilibrium shifts to the right, The concentration of ammonia increases and the concentration of both nitrogen and hydrogen decrease in accordance with the stoichiometric ratio.				1 1 1 1
	(g)		Concentrations of reactants and products become constant with time at X.				1