

## Acids & bases and Optics test MEMO August 2020

### Memo

1.1 C✓✓

1.2 D✓✓

1.3 A✓✓

2.1.1 A substance that produces **hydronium ions** when dissolved in water. ✓

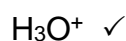
2.1.2 strong acid ✓

$$K_a > 1 \quad \checkmark$$

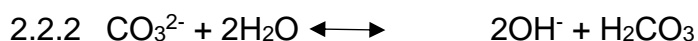
2.1.3  $\text{HSO}_4^-$  ✓

2.1.4 It ionizes to form 2 hydronium ions. ✓

2.1.5  $\text{HSO}_4^-$  ✓



2.2.1 The reaction of a salt with water. ✓✓



or



Products ✓

Balancing ✓

2.2.3 alkaline

2.3.1 phenolphthalein

2.3.2 It shows the colour change at around pH 10, suitable for a weak acid with a strong base.

2.3.3  $\text{pH} = -\log [\text{H}_3\text{O}^+]$  ✓

$$4 = -\log [\text{H}_3\text{O}^+] \quad \checkmark$$

$$[\text{H}_3\text{O}^+] = 1 \times 10^{-4} \text{ mol.dm}^{-3} \quad \checkmark$$

2.3.4  $n = cV$  ✓  
 $= 1 \times 10^{-4} (4,5 \times 10^9)$  ✓  
 $= 450\,000 \text{ mol}$

$\text{pH} = -\log [\text{H}_3\text{O}^+]$   
 $= 1 \times 10^{-6} \text{ mol} \cdot \text{dm}^{-3}$  ✓

$n = cV$   
 $= 1 \times 10^{-6} (4,5 \times 10^9)$   
 $= 4\,500 \text{ mol}$  ✓

$n_{\text{start}} - n_{\text{end}} = 445\,500 \text{ mol}$  ✓

$n_{\text{CaO}} = \frac{445\,500}{2} \checkmark = 222\,750 \text{ mol}$

$n = \frac{m}{M} \therefore m = nM = 222\,750(56)$  ✓  
 $= 12\,474\,000 \text{ g}$  ✓  
 $= 12\,474 \text{ kg}$

2.3.5 % purity =  $\frac{12\,474}{15\,000} \times 100$  ✓  
 $= 83,16\%$  ✓

3.1.1 photo electric effect ✓

3.1.2

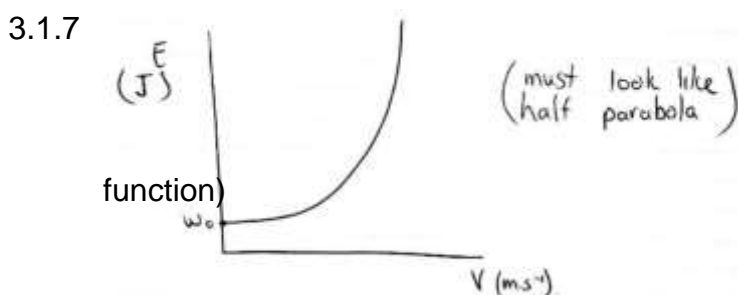
<b>OPTION 1/OPSIE 1</b>	
$E = W_0 + E_k$	} ✓ Any one/Enige een
$hf = hf_0 + E_k$	
$\frac{hc}{\lambda} = W_0 + \frac{1}{2}mv^2$	
$\frac{(6,63 \times 10^{-34})(3 \times 10^8)}{200 \times 10^{-9}}$	$= 8 \times 10^{-19} \checkmark + \frac{1}{2}(9,11 \times 10^{-31})v^2 \checkmark$
$v = 6,53 \times 10^5 \text{ m} \cdot \text{s}^{-1} \checkmark (653454,89 \text{ m} \cdot \text{s}^{-1})$	
<b>OPTION 2 / OPSIE 2</b>	
$c = \lambda f$	
$3 \times 10^8 = f(200 \times 10^{-9})$	
$f = 1,5 \times 10^{15} \text{ Hz}$	
$hf = hf_0 + E_k \checkmark$	
$(6,63 \times 10^{-34})(1,5 \times 10^{15}) \checkmark = 8 \times 10^{-19} \checkmark + \frac{1}{2}(9,11 \times 10^{-31})v^2 \checkmark$	
$v = 6,53 \times 10^5 \text{ m} \cdot \text{s}^{-1} \checkmark$	

3.1.3 Decreases ✓

3.1.4 Remains the same ✓. Intensity lower, means less electrons emitted, but with the same speed (no extra energy) ✓

3.1.5 Decreases ✓

3.1.6 less energy is transferred to  $E_k$  ✓, since the Work function is higher (more energy needed to lift the electrons to surface)



- ✓ labels with units
- ✓ Shape
- ✓ y-intercept  $W_0$  (or work)

3.2 B (orange) ✓ – orange has higher frequency than red ✓

3.3 Emission ✓