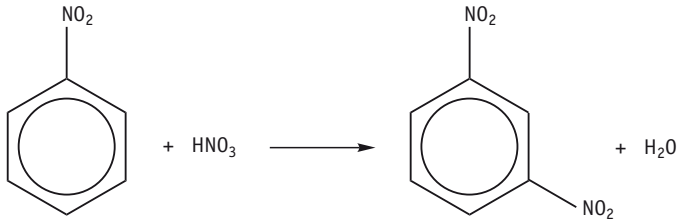
# Chapter Summary Worksheet

## Chapter 12 Arenes and their derivatives

Print out and complete this worksheet to generate a summary for Chapter 12.

**1** 1,3-dinitrobenzene can be prepared from nitrobenzene:




If the yield of the reaction is 44.4%, the mass of 1,3-dinitrobenzene produced from 12.3 g of nitrobenzene is:

- ☐ **A** 16.8 g
- ☐ **B** 16.9 g
- ☐ **C** 7.46 g
- ☐ **D** 7.50 g

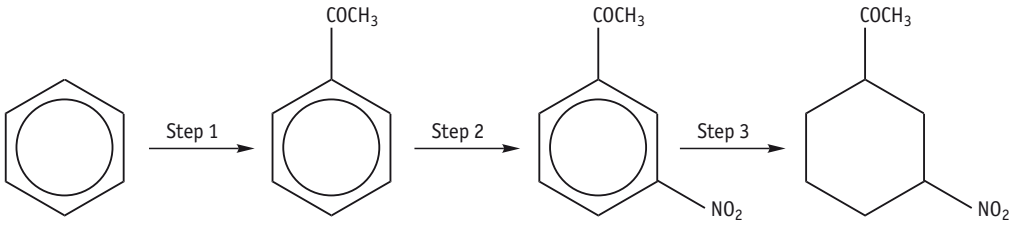
**2** When hydrogen and benzene are passed over a warm platinum catalyst:

- ☐ **A** there is no reaction as benzene undergoes substitution rather than addition
- ☐ **B** the enthalpy of the reaction is equal to three times that of the enthalpy of the reaction of hydrogen with cyclohexene
- ☐ **C** the enthalpy of the reaction is less than three times that of the enthalpy of the reaction of hydrogen with cyclohexene
- ☐ **D** the enthalpy of the reaction is more than three times that of the enthalpy of the reaction of hydrogen with cyclohexene

**3** When bromine is mixed with benzene in the presence of a catalyst:

- ☐ **A** addition does not occur as the activation energy is too high
- ☐ **B** substitution takes place, rather than addition, because the resonance energy is regained in the second step
- ☐ **C** addition does not take place because bromine is not an electrophile
- ☐ **D** substitution does not take place because bromine is not an electrophile

Questions 4, 5 and 6 are based on the following reaction scheme:




**4** Which one of the following types of reaction is **not** involved in this reaction scheme?

- ☐ **A** addition
- ☐ **B** acylation
- ☐ **C** nitration
- ☐ **D** oxidation



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**5** Which of the following types of mechanism is involved in steps 1 and 2?

- ☐ **A** electrophilic addition
- ☐ **B** electrophilic substitution
- ☐ **C** nucleophilic addition
- ☐ **D** nucleophilic substitution

**6** The reagent for step 3 is:

- ☐ **A** lithium aluminium hydride in dry ether
- ☐ **B** hydrogen in the presence of a platinum catalyst
- ☐ **C** a hot aluminium oxide catalyst
- ☐ **D** a dry aluminium chloride catalyst

**7** A compound Y burns with a smoky flame. Which of the following can be concluded from this?

- ☐ **A** It does not contain oxygen.
- ☐ **B** It has a low hydrogen-to-carbon ratio.
- ☐ **C** It is a resonance hybrid.
- ☐ **D** It has a positive $\Delta H_{formation}$.

**8** Phenol reacts rapidly with bromine water whereas benzene only reacts with liquid bromine in the presence of a catalyst. This is because:

- ☐ **A** a lone pair of electrons on the oxygen atom in phenol enters the delocalised ring
- ☐ **B** oxygen is highly electronegative
- ☐ **C** the –OH group in phenol is acidic
- ☐ **D** $Br_2(aq)$ is a stronger electrophile than the $Br^+$ formed with liquid bromine and the catalyst


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