

CHEMISTRY 235 EXPERIMENT 10

QUALITATIVE ANALYSIS

METHOD AND RESULTS

You are provided with FOUR compounds each containing one of the anions S^{2-} , SO_3^{2-} , SO_4^{2-} , $S_2O_3^{2-}$, $S_2O_8^{2-}$, NO_2^- , and NO_3^- . Perform the following tests and determine which anion is present in each of the compounds A, B, C and D. Write equations for the reactions in the deduction column. When a gas is evolved perform a confirmatory test to identify the gas unambiguously.

COMPOUND A

TEST	OBSERVATIONS	DEDUCTIONS
1) Add dil. HCl to some A. Warm.		
2) Prepare a soln. of A and use it for the following tests. Use a fresh portion for each test unless otherwise instructed.		
a) Add $BaCl_2(aq)$		
b) Add $KI(aq)$.		

TEST	OBSERVATIONS	DEDUCTIONS
c) Add dil. HNO_3 then $\text{Mn}^{2+}(\text{aq})$ then a few drops of $\text{AgNO}_3(\text{aq})$. Warm.		

COMPOUND B

TEST	OBSERVATIONS	DEDUCTIONS
1) Add dil. HCl or dil. H_2SO_4 to solid B.		
2) Add a few drops of conc. H_2SO_4 to solid B. Warm.		
3) Prepare a soln. of B and use it for the following tests. Use a fresh portion for each test unless otherwise instructed.		
a) Add $\text{Pb}(\text{NO}_3)_2(\text{aq})$		
b) Add $\text{AgNO}_3(\text{aq})$		

TEST	OBSERVATIONS	DEDUCTIONS
c) Add sodium pentacyano nitrosyl-ferrate(III)(aq) ¹ .		

COMPOUND C

TEST	OBSERVATIONS	DEDUCTIONS
1) Heat some solid C in a test tube.		
2) Warm some solid C with dil. H ₂ SO ₄ (aq). (Compare compound D.)		
3) Make a solution of C in water and use it for the following tests. Use a fresh portion for each test unless otherwise instructed.		
a) Add BaCl ₂ (aq)		
b) Add AgNO ₃ (aq)		

¹ sodium nitroprusside solution

TEST	OBSERVATIONS	DEDUCTIONS
c) Add KI(aq).		
d) Add $\text{KMnO}_4(\text{aq})$ acidified with dil. $\text{H}_2\text{SO}_4(\text{aq})$.		
e) Add conc. $\text{NaOH}(\text{aq})$ and warm. Test for ammonia. Add Devarda's alloy ² and test for ammonia again.		
f) Add freshly prepared satd. $\text{FeSO}_4(\text{aq})$ and then conc. H_2SO_4 carefully down the side of the test tube to form a lower layer. (Brown ring test.)		
g) Add diphenylamine reagent gently to form a separate liquid layer.		

²If Devarda's alloy is not available aluminium foil may be used instead.

COMPOUND D

TEST	OBSERVATIONS	DEDUCTIONS
1) Warm some solid D with dil. $\text{H}_2\text{SO}_4(\text{aq})$. (Compare compound C.)		
2) Make a solution of D in water and use it for the following tests. Use a fresh portion for each test unless otherwise instructed.		
a) Add freshly prepared satd. $\text{FeSO}_4(\text{aq})$ and then conc. H_2SO_4 carefully down the side of the test tube to form a lower layer.		
b) Add $\text{KI}(\text{aq})$ acidified with dil. $\text{H}_2\text{SO}_4(\text{aq})$.		
c) Add $\text{AgNO}_3(\text{aq})$ and warm.		

TEST	OBSERVATIONS	DEDUCTIONS
d) Add conc. NaOH(aq) and warm. Test for ammonia. Add Devarda's alloy ² and test for ammonia again.		
e) Add KMnO ₄ (aq) acidified with dil. H ₂ SO ₄ (aq).		