



**TVET CURRICULUM DEVELOPMENT, ASSESSMENT AND CERTIFICATION
COUNCIL (TVET CDACC)**

Qualification Code : 071606T4MCT
Qualification : Mechatronic Technician Level 6
Unit Code : ENG/OS/MC/CC/05/6/A
Unit of Competency : Apply material science principles

PRACTICAL ASSESSMENT

INSTRUCTIONS TO THE ASSESSOR

1. You are required to mark the practical as the candidate perform the tasks.
2. You are required to take photos and/or video clips at critical points.
3. Ensure the candidate has a name tag and registration code at the back and front.

OBSERVATION CHECKLIST

Candidate's name & Registration No.	
Assessor's name & Reg. Code	
Unit(s) of Competency	Apply material science principles
Venue of Assessment	
Date of assessment	

(Indicate the marks available and marks obtained respectively. Award marks appropriately as guided for in the items for evaluation indicated. Give a brief comment where necessary)

Items to be evaluated:	Marks Allocated	Marks Obtained	Comments
1. Identify type of engineering materials as per prescribed procedures (specimen as low carbon steel)	1		
2. Determined physical properties of engineering material according material specifications	2		
3. Identified mechanical properties of engineering materials according to material specifications (as ductile and fairly rigid)	2		
4. Identify and select engineering material according to production requirements.	2		
5. Observed safety in material testing procedures according to OSHA, 2007	2		
6. Identified corrosion types to work requirements	3		
7. Identified methods of corrosion prevention according to work requirements	3		

8. Prevented corrosion as per the prescribed corrosion prevention methods	2		
9. Maintained material testing equipment according to manufacturer specifications.	2		

PRODUCT CHECKLIST

Items to be evaluated:	Marks Allocated	Marks Obtained	Comments
10. Correct setting of apparatus	1		
11. Specimen is cut to reasonable size	1		
12. Answered assessment questions correctly	8		
13. Housekeeping performed	1		
TOTAL	30		

The candidate was found to be: Competent Not yet competent

(Please tick as appropriate)

(The candidate is competent if s/he gets 15 marks (50%) of the 30 marks on the observation and product checklist)

Feedback from candidate:

Feedback to candidate:

Candidate's signature:	Date:	
Assessor's signature:	Date:	

EXPECTED OBSERVATIONS

The HCl and NaOH will react vigorously with the aluminium – gas bubbles will be evident and the test tube will feel very warm to the touch. After approximately 15 minutes, no solid aluminium will be left and only the polymer liner that was on the inside of the can will be found. Note, the polymer strip can be hard to see at times. Use a glass stirring rod to remove it from the test tube to examine.

The aluminium in the vinegar and soda might show slight signs of degradation after 15 minutes. If allowed to sit for 24 to 48 hours, signs corrosion will be more obvious. The aluminium strip in the copper sulphate solution (with salt) will show obvious signs of reaction. Copper ions will reduce and appear as powdery copper atoms while the aluminium atoms oxidize and become ions in solution, leaving the polymer liner behind. No detectable reaction is observed in the test tube with water.

ASSESSMENT QUESTIONS

1. Why aren't all aluminum structures or products (such as window frames) coated with paint or a polymer liner? [2 marks]
 - ✓ Aluminum oxidizes rapidly when exposed to air, and the oxidation layer bonds very tightly to the surface of the aluminum.
 - ✓ This provides a protective coating of aluminum oxide that protects the aluminum underneath from corrosion.
2. Why do you think some aluminum structures or products (such as soda cans) need to be coated with paint or a polymer liner? [2 marks]
 - ✓ The structures or products are exposed to an environment (such as a fairly strong acid or base) that can dissolve or eat through the aluminum oxide on the surface,

- ✓ and thus, attack or corrode the aluminum underneath.
3. Which solutions seemed to corrode the aluminum the quickest? [1 mark]
- ✓ Acids and bases (solutions with a high pH or a low pH) will react the fastest.
4. Hypothesize what might happen if the polymer liner on the inside of a pop can was accidentally scratched before it was filled with cola. [3 marks]
- ✓ If the liner is scratched all the way through to the aluminum, the phosphoric and carbonic acids in the cola will react with (oxidize) the aluminum at the scratch.
 - ✓ The corrosion could go all the way through the aluminum to the paint on the outside.
 - ✓ With just the paint holding the can together at that point, the pressure of the fluid inside the can could cause the cola to burst through the paint.

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