Checking a Cleaning Test With Blank Coupons

Base your answers on the information provided and your knowledge of chemistry. Use the 2025 Chemistry Reference Tables as needed.

A museum tests two model cleaning liquids on coated metal coupons. A coated coupon can lose mass when its unwanted film comes off or when the metal itself dissolves. For each liquid, the class also tests an otherwise identical uncoated coupon. The model assumes that the uncoated coupon measures the metal loss that also occurs under the coating.

Liquid	Coated coupon mass lost (mg)	Uncoated coupon mass lost (mg)
P	18	7
Q	15	2

1 What does the uncoated coupon measure in the model?

(1) Only the original film mass

(2) Only the metal lost to the liquid

(3) All the film and metal lost from the coated coupon

(4) The amount of cleaning liquid remaining

2 Calculate the film mass removed by each liquid. Show how you use the uncoated records. [1]

Answer and work

A usable cleaning liquid must remove at least 12 mg of film and at most 3 mg of metal in the model test.

3 Choose the liquid that meets both requirements and justify the choice. [1]

Answer and work

In a later Q test, the coated coupon again loses 15 mg in all. A separate measurement shows that it loses just 1 mg of metal. The uncoated Q coupon still loses 2 mg.

4 Calculate the film mass actually removed in the later Q test. Compare it with the estimate based on the uncoated coupon and explain the difference. [1]

Answer and work