Salt Crystals in a Model Tile Mural

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

An art class models salt damage to a tile mural. Two tiles have the same exposed area. Tile F has a dense finish; tile P has an unglazed surface. In a pure water test the tiles soak until their mass stops changing. Students blot off surface water before measuring mass. The model treats each mass increase as water held inside the tile.

Tile	Dry mass (g)	Mass after soaking and blotting (g)
F	82.4	83.0
P	79.6	84.4

1 By how many grams did the water held inside tile P exceed the water held inside tile F? Show your work. [1]

Answer and work

2 Which structural difference is consistent with the water measurements?

(1) Tile F has more accessible pore space than tile P.

(2) Tile P has more accessible pore space than tile F.

(3) Tile P contains fewer particles because its dry mass is lower.

(4) Tile F’s coating turns absorbed water into a different compound.

The class repeats the test on pieces of tile P using the same salt solution. During each drying step, water evaporates and dissolved salt can remain as crystals inside the pores. The class wants a treatment that reduces visible damage to at most 4% of the surface and can be removed without taking away any tile material.

Treatment	Damage after ten cycles (%)	Removable without tile loss?
None	18	No treatment to remove
Coating R	3	Yes
Coating S	1	No
Coating T	6	Yes

3 Explain why evaporating water can lead to solid salt appearing inside a pore. [1]

Answer and work

4 Which treatment meets both requirements of the classroom model?

(1) No treatment

(2) Coating R

(3) Coating S

(4) Coating T

5 A student says the results show that the chosen treatment will work for a full year. Identify one limitation of the data and one measurement that would address it. [1]

Answer and work