

History Channel--Modern Marvels: Copper

1. What is the major company in San Diego? Shipbuilding
2. **T** F Ships use a lot of copper.
3. Where is copper found in the ships?
 - a. wiring
 - b. In paint
 - c. In pipe alloys
 - d. In propeller
 - e. Any part of ship that comes into contact with seawater.
4. Copper is resistant to salt water corrosion.
5. Copper-Nickel is used in seawater pipes.
 - a. What is the percentage of copper? 70%
 - b. Of nickel? 30%
6. How are propellers made? Casting
7. What does inspection look for? Small cracks
8. Copper is antimicrobial.
 - a. What does copper protect ships from? Micro-organisms and barnacles
9. Copper prevents sea life from adhering to hulls.
 - a. How is it applied to the hulls? It is included in paint on the hulls.
10. **T** F Copper exists in electronic gadgets.
11. Beyond corrosion, killing bacteria, and conductivity, copper is beautiful.
 - a. What happens to copper on statues and roofs? It turns green.
12. **T** F In ancient times, copper could be found on the ground.
13. What did the ancient Egyptians discover? Smelting
14. What is smelting? Heating metal to remove impurities
15. How does smelting work? Carbon combines with oxygen to remove impurities.
16. Copper and tin makes bronze.
 - a. Who discovered bronze? The Egyptians
17. What replaced the Bronze Age? the Iron Age
18. Copper mining uses some the largest dump trucks in the world.
19. What are the steps in the copper mining process to bring copper to the surface.
 - a. Exploration by holes.

- b. Make holes
 - c. Explosive devices
 - d. Loosens ore
 - e. Shovels remove ore
 - f. Copper at surface is exposed to oxygen
 - g. Sprays weak acid bath
 - h. Copper sulfate
20. Deeper copper is in sulfite form. It uses a different process for extraction
- a. Crushed to sand
 - b. Water and chemicals added to create a slurry.
 - c. Copper floats to top on bubbles
 - d. Scooped off top
 - e. 99.6% pure cu, not pure enough for electronics
 - f. Electro refining
 - g. Acid bath for 10 days
21. Each ton of ore = 6 pounds of copper.
22. 1,000,000 tons of copper is recycled each year.
23. What industry uses a lot of recycled copper? Plumbers
24. What is the industry name for pipes? Tubes
25. What process is used to create tubes? Extrusion
26. Who applied early copper tubing for water? Egyptians
27. Antimicrobial properties, perhaps used on hospital surfaces e coli, staph
28. What type of metal is used to make bells? Bell bronze
- a. What is the percentage of copper? 80% cu,
 - b. What is the percentage of tin? 20%
 - c. Why is this percentage of mixture used? It's about the sound of the bell.
29. How are bells made? They are poured into mold.
30. What happens if the bell metal is not cooled consistently? Bell cracks on first strike.
31. What happens to copper when you hammer it? It gets harder
32. What temperature do you take copper annealing? Below the melting point
33. Copper has a crystal structure. Patina is a crystalline structure on surface.

- a. How long does it take copper to show a patina? 10 years to create
- 34. Copper's 29th electron moves freely. Electrons drift through atoms of copper.
 - a. It is easy to accelerate electrons.
- 35. Copper is second to silver but cheaper.
- 36. Aluminum is used for long distance electrical transmission due to weight.
 - a. Aluminum is lighter than copper.
- 37. Copper wire and cables are used for communication lines under the ocean.
 - a. Cables require pure copper.
- 38. New alloys expand copper's reach.
 - a. What does copper alloy easily with? tin and zinc, chromium and manganese.
- 39. Near future, thread in clothing for tiny antennae.
 - a. What alloys are used for the wire thread? copper, nickel, and silicon
- 40. What does aluminum add to copper? hardness
- 41. How are the airplane struts made? Casting
- 42. Tensile testing determines ductility.
- 43. Does copper have usefulness into the future? Yes