Copper - Cu

Hardness = 2.5 - 3. Cleavage: None observed. Flexible but often easily broken at narrow points (where crystals meet). Tolerates sonication. Literature data on acid resistance is inconsistent except for HNO_3 which all agree readily attacks. Best to avoid acids but if an acid must be used try the mildest acid first. Based on various published cleaning formulas, tolerates NaOH, KOH, ammonium acetate, Rochelle salt, tartaric acid, H_3PO_4, dilute citric acid, dilute to concentrated H_2SO_4, dilute to glacial acetic acid and ketchup. Tolerates Iron OUT/EDTA, hot oxalic acid and NH_3. Tolerates NH_4HF_2 but may etch somewhat resulting in a bright (but not unnaturally so) surface with distinct crystallinity. Avoid commercial copper cleaning products as these may contain problematic chemicals. However, associated secondary copper minerals often not tolerant of one or more of these chemicals. Remove calcite with dilute H_2SO_4 or sulfamic acid. Patina may be restored (given a more natural appearance) by immersion in 12% H_2O_2.

Treat copper-silver intergrowths ('halfbreeds') as both copper and silver.

References

Mindat: https://www.mindat.org/min-1209.html

Handbook of Mineralogy: https://www.handbookofmineralogy.org/pdfs/copper.pdf

Hardinger, S. (2025) Mineral Specimen Cleaning and Development for the Amateur, 339 p.

Sinkankas, J. (1972) Gemstone & Mineral Data Book, 346 p. Winchester Press, New York.