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Optimization of the Acetic Acid method for microfossil extraction from lithified carbonate rocks: Examples from the Jurassic and Miocene of Saudi Arabia

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We report the first ever use of the acetic acid processing method for the extraction of microfossils from indurated limestones in Saudi Arabia. Two different limestone samples from Middle Jurassic and Middle Miocene formation in Saudi Arabia were tested under different concentrations of acid from 50% to 100% and with processing times from 2 hours to 10 hours, in an attempt to optimize the processing methodology. The recovery of acid residues shows a similar trend for both Jurassic and Miocene samples. The weight percentage of residue particle size > 1 mm decreases as acid concentration increases, especially in the 50 to 80% acid concentration range, and the weight percentage of the smallest size particles >0.063 mm increases as acid concentration increases. The small fraction of residue between 0.50 – 0.063 mm was split into 3 g subsamples and picked for microfossils in order to assess their preservation.

All concentrations of acetic acid tested show promising results for both the Jurassic Dhruma and Miocene Dam formation carbonates. Higher acid concentrations with longer reaction times yield better recovery than higher concentrations with less reaction time. Based on our experiment, we recommended a 60% concentration of acetic acid to be the optimal concentration for use on routine micropaleontological samples of Saudi Arabian carbonate rocks. By lowering the concentration of acetic acid from 80% to 60%, the consumption of acid is reduced without compromising the recovery of microfossils, and the sample can be processed in a more environmentally friendly manner.