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Experimental Study on the Variation of Micro structure of Coal under Chemical Solution

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Coal is a low permeability solid medium with pores and fracture structures., pore penetration affects the coal seam permeability. In order to damage the porous structure of coal to achieve the purpose of increasing penetration, X-ray diffraction (XRD) and fourier transform infrared spectroscopy (FTIR) were used to study the changes of mineral composition, mineral crystal particle size, morphology and bonding state before and after chemical solution immersion. The microscopic pore structure changes of coal before and after immersion in chemical solution were studied by means of scanning electron microscope (SEM) and mercury intrusion porosimetry test (MIP). The laws of the physical and mechanical properties of the coal were studied through the longitudinal wave velocity and uniaxial compression experiments before and after immersion in chemical solution. The mechanism of chemical damage of coal was discussed, and the damage evolution model of coal was established under chemical solution. The results show that: after chemical reaction ,the content of carbonate minerals in coal decreased, the content of clay minerals increased and the mineral cement became loose. The microscopic pore size increased, and the porosity increased, the pores interpenetrate and the longitudinal wave velocity decreased. The mechanical properties of coal have the tendency to change from brittle failure to ductile failure. The damage of chemical solution to the structure of coal is a cumulative damage process from micro-destruction to macro-degradation, Mainly by the chemical effects caused (including dissolution, hydrolysis, ion exchange and adsorption and desorption, etc.) .

References

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